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NATIONAL COMMUNICATIONS

COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION

First compilation and synthesis of second national communications from Annex I Parties

Addendum

TABLES OF INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS FOR 1990-1995 AND PROJECTIONS UP TO 2020

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General notes

Data on inventories of emissions and removals as well as data on projections are included in the tables below. The purpose of these tables is to present in a consistent and comparable fashion inventory data from the 18 reporting Parties included in Annex I to the Convention, namely Austria (AUT), Belgium (BEL), Canada (CAN), the Czech Republic (CZE), Finland (FIN), France (FRA), Germany (DEU), Iceland (ICE), Ireland (IRE), the Netherlands (NLD), New Zealand (NZL), Norway (NOR), Slovakia (SLO), Sweden (SWE), Switzerland (CHE), the United Kingdom of Great Britain and Northern Ireland (GBR) and the United States of America (USA). Monaco (MON), though not an Annex I Party, has submitted its second national communication according to its declared intention to be bound by Article 4.2 (a) and (b) of the Convention. The tables include comments and footnotes where appropriate, as well as charts provided for illustrative purposes.

It should be noted that the figures presented here do not necessarily correspond to those in the national communications as originally submitted, as some Parties have provided updates.

Figures may differ from those submitted to the secretariat as a result of rounding during data input and processing, corrections of typographical and calculation errors or omissions, and the presentation (for consistency and comparability) of subtotals and totals not provided in the communications or other submissions. Some differences are also due to the fact that, in striving to ensure consistency and comparability of results, the secretariat has had to convert some of the estimates reported so that they concur with the guidelines for preparation of national communications.

Explanatory notes

Blanks in the tables signify an absence of quantitative information. The secretariat has chosen to to leave the spaces blank ir order not to complicate the reading of the tables. The figure "zero' appears in the table only when reported as such by Parties.

The revised 1996 Intergovernmental Panel on Climate Change (IPCC) guidelines for national GHG inventories are hereafter referred to as the IPCC guidelines, and the revised guidelines for the preparation of national communications from Annex I Parties (Annex to decision 9/CP.2, FCCC/CP/1996/15/Add.1) as the FCCC guidelines. Categories of sources of GHG emissions or their sinks corresponding to the IPCC guidelines' nomenclature are given in *italics*.

The following chemical symbols and abbreviations have been used:

CF_4	tetrafluoromethane
CFCs	chlorofluorocarbons
C_2F_6	hexafluoroethane
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
HCFCs	hydrochlorofluorocarbons
HFCs	hydrofluorocarbons
N_2O	nitrous oxide
NO_x	nitrogen oxides
NMVOCs	non-methane volatile organic compounds
PFCs	perfluorocarbons
SF_6	sulphur hexafluoride
VOCs	volatile organic compounds

The following units of weight have been used:

Gg gigagram (10^9 grams)

Table A.1. Anthropogenic CO_2 emissions, excluding land-use change and forestry[a], 1990 (Gigagrams and percentage of total by Party)

	Energy				Industrial Processes		Waste		Other[b]		Total
	Fuel Combustion[c]		Fugitive Fuel								
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	46 490	75.1	2 140	3.5	12 700	20.5	10	0.0	540	0.9	61 880
Belgium	105 919	91.2			9 188	7.9	983	0.8			116 090
Canada	426 000	92.0	7 620	1.6	21 800	4.7	691	0.1	7 090	1.5	464 000
Czech Republic	160 073	96.7			5 417	3.3					165 490
Finland	52 600	97.6	100	0.2	1 200	2.2					53 800
France	356 259	94.2	432	0.1	16 638	4.4	2 766	0.7	2 284	0.6	378 379
Germany	986 640	97.3			27 515	2.7					1 014 155
Iceland	1 674	77.9	79	3.7	391	18.2			4	0.2	2 147
Ireland	29 038	94.5			1 627	5.3	54	0.2			30 719
Monaco							71	100.0			71
Netherlands[d]	164 800	98.4			1 850	1.1	900	0.5			167 550
New Zealand	22 474	88.2	615	2.4	2 387	9.4					25 476
Norway	26 938	75.8	1 760	5.0	6 514	18.3	14	0.0	319	0.9	35 544
Slovakia	56 585	94.3			3 447	5.7					60 032
Sweden	51 329	92.6	53	0.1	3 787	6.8			276	0.5	55 445
Switzerland	40 330	89.5	56	0.1	3 363	7.5	1 320	2.9			45 070
United Kingdom	571 199	96.6	7 291	1.2	10 304	1.7	814	0.1	1 430	0.2	583 747
United States[e]	4 903 120	98.7			62 390	1.3					4 965 510
Total	8 001 468	97.2	20 146	0.2	190 518	2.3	7 623	0.1	11 943	0.1	8 225 105

[a] In the light of the different ways of reporting used by Parties, emissions from *land-use change and forestry* were excluded from the table for comparison and consistency purposes; they are however presented in table A.5.

[b] Includes *solvent use* and *agriculture*.

[c] See notes to table A.3.

[d] Party also provided estimates adjusted for temperature correction, but non-adjusted estimates were included in this table for comparison and consistency purposes.

[e] As Party provided estimates in carbon equivalent, the secretariat converted estimates to equivalent CO_2 emissions.

Comments

Since only 18 Parties are considered in this compilation and synthesis, total CO_2 emissions reported here only represent 60 per cent of the total of the first national communications' 1990 inventories. Although almost all Parties submitting a second national communication had recalculated their 1990 inventory, the relative shares of the various sources in total CO_2 emissions have not changed significantly.

As in the 1990 inventories of first national communications, *fuel combustion* was the largest source of CO_2 emissions, representing 97.2 per cent of the total. *Industrial processes* accounted for 2.3 per cent, mainly from the production of cement and clinker. It should be noted that estimates of emissions from energy production, industrial processes and waste are often not comparable among Parties because they are based on different assumptions about source definitions and allocation of feedstocks.

For 12 Parties, CO_2 emissions from *fuel combustion* represented more than 90 per cent of total CO_2 emissions. For 5 of them (CZE, DEU, FIN, GBR, NLD, USA) this share was higher than 95 per cent, the United States having the highest value among them with 98.7 per cent. No *fuel combustion* emissions are shown for Monaco, as only emissions from waste incineration were reported. For Austria, Iceland, New Zealand and Norway, the *fuel combustion* share ranges from 75 per cent (Austria) to 88 per cent (New Zealand), Austria reporting much lower emissions than in the 1990 inventory of its first national communication. Each of these countries reported higher shares of industrial process emissions (20.5, 18.2, 9.4 and 18.3 per cent, respectively), which is a consequence of reporting rather than of a higher level of industrial development than in other countries. This group of countries reported emissions from the iron and steel industry in the category of *industrial processes*, while many other countries reported most of these emissions in the *fuel combustion* category. This is an indication that, in general, feedstocks were documented differently by Parties, depending on the methodology used to estimate greenhouse gas emissions. Parties using CORINAIR or another bottom-up approach generally allocated iron and steel production to the *industrial processes* category, while Parties using the IPCC or another top-down approach were likely to report these emissions in the *fuel combustion* category. In contrast to the first national communications, the allocation of feedstocks was in general better documented in the second national communications, avoiding double-counting between the *energy* and *industrial processes* sectors.

Only 10 countries reported CO_2 *fugitive fuel emissions*, but they represent less than 0.2 per cent of the total for 4 of them. At 5 per cent, Norway had the highest value among the 6 remaining Parties.

Ten Parties reported emissions from *waste* mainly as a consequence of incineration processes. These emissions accounted for less than 1 per cent of the total for eight of them, but reached a value of 2.9 per cent for Switzerland, which had the highest share. For this Party, as well as for Austria, Canada and Ireland, it was unclear whether they followed the guidelines properly by excluding CO_2 emissions from combustion of organic biogenic waste. Even so, it should be noted that this kind of deviation has practically no effect on the aggregated CO_2 emission estimates. Belgium, France, the Netherlands, Norway and the United Kingdom, explained clearly that they only included in the CO_2 waste emissions those coming from combustion of fossil-fuel based products. It is also possible that Parties not reporting CO_2 emissions from waste incineration but having this kind of process, did not include the combustion of products made from fossil fuels in their totals.

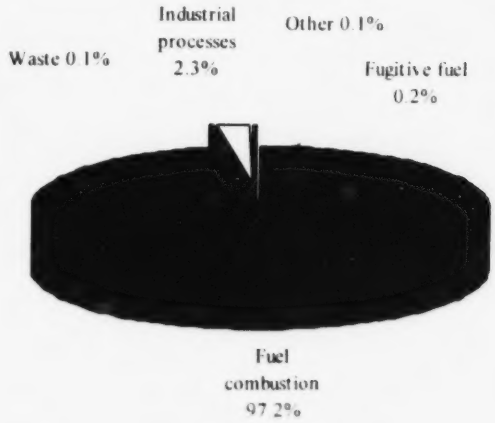

Figure A.1 Distribution of CO_2 emissions by source categories, 1990

Table A.2. Anthropogenic CO_2 emissions, excluding land-use change and forestry[a], 1995 (Gigagrams and percentage of total by Party)

	Energy				Industrial Processes		Waste		Other[b]		Total
	Fuel combustion[c]		Fugitive fuel								
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	47 950	77.3	2 350	3.8	11 300	18.2	10	0.0	410	0.7	62 020
Belgium[d]	109 748	90.5			10 456	8.6	1 093	0.9			121 297
Canada	460 886	92.3	10 589	2.1	24 834	5.0	737	0.1	2 481	0.5	499 526
Czech Republic	124 647	96.8			4 170	3.2					128 817
Finland	55 130	98.4	80	0.1	840	1.5					56 050
France	356 588	92.5	7 337	1.9	15 866	4.1	3 764	1.0	1 792	0.5	385 347
Germany	869 300	97.2			25 200	2.8					894 500
Iceland	1 774	77.7	79	3.5	425	18.6			5	0.2	2 282
Ireland	32 105	94.6			1 772	5.2	54	0.2			33 931
Monaco[e]	78	60.3					51	39.7			129
Netherlands[f]	180 400	98.4			2 000	1.1	900	0.5			183 400
New Zealand	24 004	87.7	627	2.3	2 736	10.0					27 367
Norway	28 854	76.2	1 724	4.6	6 969	18.4	15	0.0	317	0.8	37 880
Slovakia	45 426	93.6			3 090	6.4					48 516
Sweden	53 385	91.9	16	0.0	4 458	7.7			249	0.4	58 108
Switzerland	40 130	90.9	70	0.2	2 620	5.9	1 350	3.1			44 170
United Kingdom	525 582	96.7	6 235	1.1	9 178	1.7	814	0.1	1 529	0.3	543 338
United States[g]	5 144 626	98.7	6 200	0.1	63 884	1.2					5 214 710
Total	8 100 612	97.1	35 307	0.4	189 798	2.3	8 788	0.1	6 783	0.1	8 341 388

[a] In the light of the different ways of reporting used by Parties, emissions from land-*use change and forestry* were excluded from the table for comparison and consistency purposes, however are presented in table A.5.

[b] Includes *solvent use* and *agriculture*.

[c] See notes to table A.3.

[d] As Party did not provide estimates for all sources for 1995, estimates for 1994 are given in this table.

[e] As Party did not provide estimates for 1995, but for 1996, these estimates are given in this table.

[f] Party also provided estimates adjusted for temperature correction, but non-adjusted estimates were included in this table for comparison and consistency purposes.

[g] As Party provided estimates in carbon equivalent, the secretariat converted estimates to equivalent CO_2 emissions.

Comments

Due to the fact that only 18 Parties are considered in this compilation and synthesis, total CO_2 emissions reported here only represent 60 per cent of the total CO_2 emissions of the first national communications' 1990 inventories from Annex I countries.

As in the 1990 inventories *fuel combustion* still remains the largest source of CO_2 emissions, representing 97.1 per cent of the total. *Industrial processes* accounted for 2.3 per cent, mainly due to the production of cement and clinker. It should be noted that emissions from *energy*, *industrial processes* and *waste* are often not comparable among Parties because they are estimated on the basis of different assumptions applied by them about source definitions and allocation of feedstocks.

For 13 Parties, CO_2 emissions from *fuel combustion* represented more than 90 per cent of total CO_2 emissions. For 6 of them (CZE, DEU, FIN, GBR, NLD and USA) this share was higher than 95 per cent, the United States having the highest value among them with 98.7 per cent. For Austria, Iceland, Monaco, New Zealand and Norway, the *fuel combustion* share was lower, ranging from 60 per cent (Monaco) to 88 per cent (New Zealand). Each of these countries, except Monaco, reported higher shares of *industrial processes* emissions (18.2, 18.6, 10.0 and 18.4 per cent, respectively). These higher CO_2 emissions in the *industrial processes* sector are due to the fact that emissions from the iron and steel industry were included in this sector, while many other countries reported the bulk of these emissions in the *fuel combustion* sector. This indicates that in general, the treatment of feedstocks was documented differently by Parties, depending on the methodology used to estimate greenhouse gas emissions. Parties using the CORINAIR or another bottom-up approach generally allocated iron and steel in the *industrial processes* sector, while Parties using the IPCC or another top-down approach are likely to have reported these emissions in one of the fuel combustion categories.

Only 11 Parties reported CO_2 *fugitive fuel emissions*. For four of them these emissions represent less than 0.2 per cent of the total. At 4.6 per cent, Norway had the highest figure among the seven remaining Parties.

Ten Parties reported emissions from *waste* mainly as a consequence of incineration processes. These emissions remained small for the majority of Parties (less than 1 per cent), but reached a value of 3 per cent for Switzerland. For this Party, as well as for Austria, Canada and Ireland, it was unclear whether they had included emissions arising from combustion of biogenic waste. They probably included biogenic CO_2 emissions in their totals, which is in contradiction to the IPCC Guidelines. Even so, it should be noted, that this kind of deviation practically has no affect on the aggregated CO_2 emissions estimates. Belgium, France, the United Kingdom, the Netherlands and Norway explained clearly that they only included in the CO_2 waste emissions those arising from combustion of fossil fuel-based products following properly the guidelines. For Parties not reporting CO_2 emissions from waste incineration but having this kind of process, it is possible that they did not include in their inventories emissions from the combustion of products made from fossil fuels.

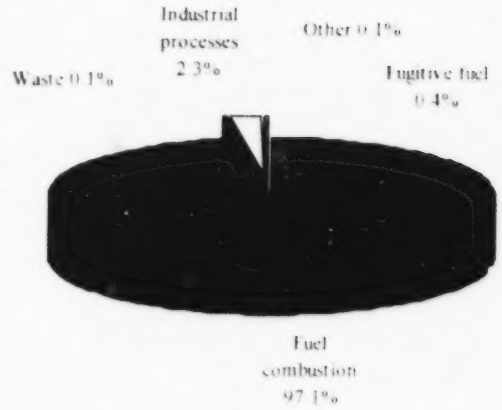

Figure A.2 Distribution of CO_2 emissions by source categories, 1995

Table A.3. Anthropogenic CO_2 emissions from fuel combustion, 1990 (Gigagrams and percentage of total by Party)

	Energy and transformation industries		Industry		Small combustion[a]		Transport		Other[b]		Total
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	12 410	26.7	7 220	15.5	12 850	27.6	13 970	30.0	40	0.1	46 490
Belgium	28 140	26.6	31 027	29.3	26 262	24.8	19 964	18.8	526	0.5	105 919
Canada	145 000	34.0	71 900	16.9	69 830	16.4	140 000	32.9			426 000
Czech Republic	94 090	58.8	23 104	14.4	35 948	22.5	7 959	5.0			160 073
Finland	19 500	37.1	13 700	26.0	7 900	15.0	11 500	21.9			52 600
France	81 881	23.0	49 597	13.9	99 860	28.0	124 921	35.1			356 259
Germany	439 427	44.5	169 741	17.2	198 190	20.1	158 647	16.1	20 635	2.1	986 640
Iceland	4	0.2	243	14.5	704	42.1	721	43.1	2	0.1	1 674
Ireland	10 863	37.4	5 431	18.7	7 859	27.1	4 885	16.8			29 038
Monaco[c]											
Netherlands[d]	51 400	31.2	48 200	29.2	37 300	22.6	26 800	16.3	1 100	0.7	164 800
New Zealand	6 079	27.0	4 766	21.2	2 766	12.3	8 748	38.9	115	0.5	22 474
Norway	7 444	27.6	3 023	11.2	2 506	9.3	13 885	51.5	80	0.3	26 938
Slovakia	11 970	21.2	25 398	44.9	13 813	24.4	5 168	9.1	234	0.4	56 585
Sweden	8 849	17.2	13 051	25.4	10 672	20.8	18 650	36.3	107	0.2	51 329
Switzerland	963	2.4	5 406	13.4	18 322	45.4	14 668	36.4	972	2.4	40 330
United Kingdom	231 954	40.6	97 045	17.0	111 703	19.6	117 944	20.6	5 263	0.9	571 199
United States[e]											
Total	1 149 974	37.1	568 852	18.4	656 485	21.2	688 430	22.2	29 074	0.9	3 098 348

[a] Includes emissions from the source/sink categories: *commercial/institutional*, *residential* and *agriculture/forestry/fishing*.
[b] Includes emissions from all other non-specified fuel combustion except from combustion of biomass. Includes emissions from military fuel use.
[c] Party only reported CO_2 emissions from waste incineration.
[d] Party also provided estimates adjusted for temperature correction; non-adjusted estimates were however included in this table for comparison and consistency purposes.
[e] Party only provided an aggregated estimate for *fuel combustion*, (see table A.1).

Comments

As in the 1990 inventory of first national communications, the *energy and transformation industries* were still identified as the largest source of CO_2 emissions (37.1 per cent) from fuel combustion. The *transport* sector, with 22.2 per cent, ranks second, directly followed by *small combustion* having nearly the same share, 21.2 per cent.

Although *energy and transformation industries* constituted the largest source, the sectoral analysis showed important differences among Parties. This sector constituted the largest source for seven (CAN, CZE, DEU, FIN, GBR, IRE and NLD) of the reporting Parties with a proportion ranging from 58.8 per cent (Czech Republic) to 31.2 per cent (Netherlands). With the exception of Finland (61 per cent), these Parties also had higher percentages of fossil fuel in their national primary energy supply*, ranging from 75 per cent (Canada) to 99 per cent (Ireland). This explains the high shares of emissions in this sector. For the other nine reporting countries, proportions range from 28 to 0 per cent, with Iceland and Switzerland having shares lower than 3 per cent. Most of the Parties presenting low emissions in this sector had a lower fossil fuel dependence in their national energy balance of 1990 and a higher reliance on geothermal, nuclear and hydropower generation and/or imported electricity.

In the *transport* sector, Parties had shares ranging from 51.5 per cent (Norway) to 5.0 per cent (Czech Republic). For six Parties (AUT, FRA, ICE, NOR, NZL, and SWE), this sector was the greatest source, with shares ranging from 51.5 to 30 per cent, Austria having the lowest share in this group. The generally low fossil fuel dependence in other sectors for this group of countries causes a shift in the proportions towards the *transport* sector, resulting in higher shares in *transport* and lower shares in the *energy and transformation industries*. Austria is the only Party in this group having a high share of fossil fuels in its national energy balance, 78 per cent.

For Annex II Parties and Parties that are in the process of transition to a market economy, different patterns become visible in the *transport* sector. The two reporting Parties belonging to the latter group, the Czech Republic and Slovakia, are the only ones with shares less than 10 per cent: 5.0 and 9.1 per cent, respectively. For the reporting Annex II Parties, transport emissions make up more than 16 per cent of the *fuel combustion* total and, for eight of them, more than 25 per cent. These different patterns are explained by the higher use of public transport and the smaller share of private cars in the EIT countries.

Although the reporting level of the *residential, commercial/institutional* and other energy use in *agriculture, forestry and fishing* categories (*small combustion*) was high, the definition of this sector varied much amongst the Parties, making a consistent comparison difficult. In this sector Parties gathered information in different ways, allocated emissions differently, or did not follow strictly the IPCC format. These facts, together with the different national circumstances, provoked a wide variance in the *small combustion* category, ranging from 45.4 per cent (Switzerland) to 9.3 per cent (Norway) with a value for this group as a whole of 21.2 per cent. In the case of Switzerland, this sector was the most important source of CO_2 emissions in the *fuel combustion* sector.

Emissions from the *industry* sector accounted for 18.4 per cent, with shares ranging from 44.9 (Slovakia) to 11.2 per cent (Norway). For two countries, Belgium (29.3 per cent) and Slovakia, *industry* was the largest source of CO_2 emissions in the *fuel combustion* sector. In Slovakia the noticeable change in relation to the first national communication is due to a different allocation of emissions from the *energy and transformation industries* category and the *industry* category.

* Based on International Energy Agency data

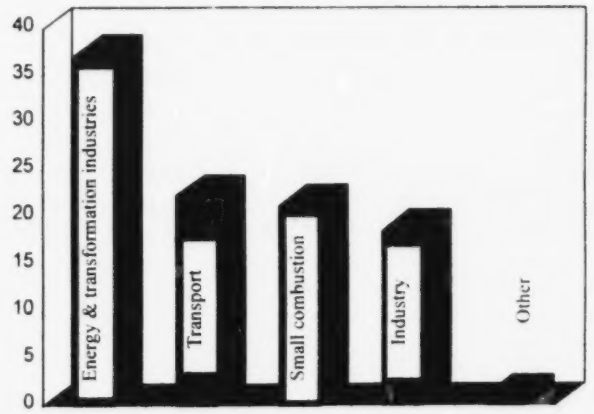

Figure A.3 Distribution of CO_2 fuel combustion emissions by source categories, percentage, 1990

Table A.4. Anthropogenic CO_2 emissions from fuel combustion, 1995 (Gigagrams and percentage of total by Party)

	Energy and transformation industries		Industry		Small combustion[a]		Transport		Other[b]		Total
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	11 050	23.0	7 390	15.4	13 580	28.3	15 880	33.1	40	0.1	47 950
Belgium	29 141	26.5	27 908	25.4	30 832	28.0	21 834	19.9	221	0.2	109 936
Canada	160 690	34.9	75 319	16.3	74 425	16.1	150 453	32.6			460 886
Czech Republic	66 574	53.4	30 124	24.2	19 039	15.3	8 912	7.1			124 647
Finland	21 720	39.4	13 570	24.6	8 710	15.8	11 130	20.2			55 130
France	67 645	19.0	52 564	14.7	101 756	28.5	134 623	37.8			356 588
Germany	373 200	42.9	126 800	14.6	186 100	21.4	170 700	19.6	12 500	1.4	869 300
Iceland	4	0.2	212	12.0	808	45.6	749	42.2	1	0.0	1 774
Ireland	13 189	41.1	3 442	10.7	9 265	28.9	6 209	19.3			32 105
Monaco[c]					51	65.2	27	34.8			78
Netherlands[d]	59 500	33.0	47 400	26.3	40 700	22.6	30 100	16.7	2 500	1.4	180 400
New Zealand	4 741	19.8	5 416	22.6	2 775	11.6	10 983	45.8	89	0.4	24 004
Norway	9 059	31.4	3 220	11.2	1 891	6.6	14 578	50.5	107	0.4	28 854
Slovakia	23 641	52.0	9 479	20.9	8 090	17.8	4 216	9.3			45 426
Sweden	10 493	19.7	13 541	25.4	9 903	18.6	19 341	36.2	107	0.2	53 385
Switzerland	1 150	2.9	5 170	12.9	18 290	45.6	14 580	36.3	940	2.3	40 130
United Kingdom	198 570	37.8	88 479	16.8	114 893	21.9	119 787	22.8	3 852	0.7	525 582
United States	1 811 186	35.2	1 099 118	21.4	597 105	11.6	1 598 375	31.1	38 842	0.8	5 144 626
Total	2 861 553	35.3	1 609 152	19.9	1 238 213	15.3	2 332 477	28.8	59 199	0.7	8 100 800

[a] Includes emissions from the source/sink categories: commercial/institutional, residential and agriculture/forestry/fishing.
[b] Includes emissions from all other non-specified fuel combustion except from combustion of biomass. Includes emissions from military fuel use.
[c] As Party did not provide estimates for 1995, but for 1996, these estimates are given in this table.
[d] Party also provided estimates adjusted for temperature correction; non-adjusted estimates were however included in this table for comparison and consistency purposes.

Comments

In the *fuel combustion* sector, representing 97 per cent of all CO_2 emissions (excluding *land-use change and forestry*), the *energy and transformation industries* were identified as the largest source of CO_2 emissions (35.3 per cent). *Transport*, with 28.8 per cent, ranks second, followed by industry (19.9 per cent).

Although the *energy and transformation industries* constituted the largest source, the sectoral analysis showed important differences between Parties. For half of the 18 reporting Parties this sector constituted the largest source, ranging from 53.4 per cent (Czech Republic) to 33.0 per cent (Netherlands). Most of them also have higher percentages of fossil fuel in their national primary energy supply, which explains the high shares of emissions in this sector. For the other nine Parties, proportions range from 31 to 0 per cent, with Iceland and Switzerland having shares lower than 3 per cent, and Monaco having none. Most of the Parties presenting low emissions in this sector have a lower fossil fuel dependence in their national energy balance and a higher reliance on geothermal, nuclear and hydropower generation and/or imported electricity.

In the *transport* sector, Parties have shares ranging from 50.5 per cent (Norway) to 7.1 per cent (Czech Republic). For five Parties (AUT, FRA, NOR, NZL and SWE), this sector was the largest source, with a proportion ranging from 50.5 to 33.1 per cent, Austria having the lowest share in this group (33.1 per cent). The generally low fossil fuel dependence in this group of countries causes a shift in the proportions towards the *transport* sector, resulting in higher shares in *transport* and lower shares in the *energy and transformation industries*. Austria is the only Party in this group having a high share of fossil fuels in its national energy balance.

For Annex II Parties and Parties that are in the process of transition to a market economy, different patterns become visible in the *transport* sector. The two Parties belonging to the latter group, the Czech Republic and Slovakia, have shares of less than 10 per cent: 7.1 per cent and 9.3 per cent, respectively. For the 15 reporting Annex II Parties and Monaco, *transport* emissions make up more than 16 per cent of the *fuel combustion* total and, for 10 of them, more than 25 per cent. These different patterns are due to the higher use of public transport and the smaller share of private cars in the EIT countries.

Emissions from the *industry* sector accounted for 19.9 per cent of the *fuel combustion* total, with proportions ranging from 26.3 per cent (Netherlands) to 10.7 per cent (Ireland), Monaco having no emissions in this sector.

Although the reporting level of the *residential, commercial/institutional* and other energy use in *agriculture, forestry and fishing* categories (*small combustion*) was high, the definition of this sector varied significantly amongst the Parties, making a consistent comparison difficult. Parties gathered information on this sector in different ways, allocated emissions from these sources differently, or did not follow strictly the IPCC format. These facts, together with the different national circumstances, provoked a wide variance in the emission estimates from *small combustion*, ranging from 65.2 (Monaco) to 6.6 per cent (Norway) with a value for this group as a whole of 15.3 per cent. For Belgium, Iceland and Switzerland, the *small combustion* category was the largest source of *fuel combustion* emissions, the proportions being 28 per cent for Belgium and 45.6 per cent for Iceland and Switzerland.

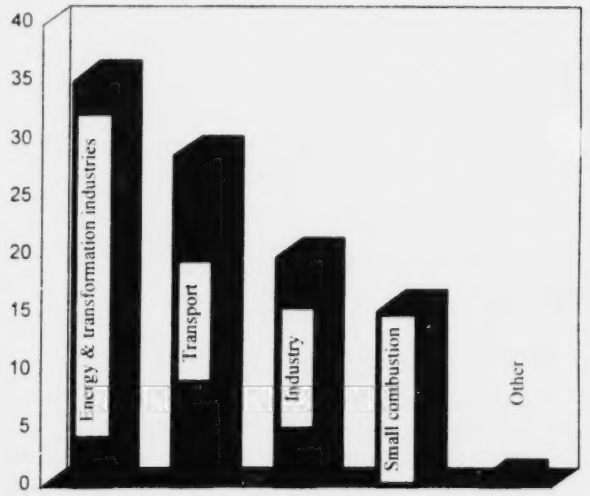

Figure A.4 Distribution of CO_2 fuel combustion emissions by source categories, percentage, 1995

Table A.5. Anthropogenic CO_2 emissions and removals[a] from land-use change and forestry and impact on total CO_2 emissions, 1990 and 1995, (Gigagrams)

	Land-use change and forestry, net emissions or removals		National CO_2 emissions including land-use change and forestry		Percentage reduction or increase (-/+) of national CO_2 emissions taking into account land-use change and forestry	
	1990	**1995**	**1990**	**1995**	**1990**	**1995**
	(Gg)	**(Gg)**	**(Gg)**	**(Gg)**	**%**	**%**
Austria	-13 300	-13 580	48 580	48 440	-21	-22
Belgium[b]	-2 057	-2 057	114 033	119 240	-2	-2
Canada[c]						
Czech Republic	-2 281	-5 454	163 209	123 363	-1	-4
Finland[d]	(-30 000)- (-19 000)	(-14 000) - (-7 000)	23 800 - 34 800	46 250-52 250	(-56) - (-35)	(-22) - (-12)
France	-33 218	-46 801	345 161	338 546	-9	-12
Germany	-30 000	-30 000	984 155	864 500	-3	-3
Iceland[e]						
Ireland	-5 160	-6 230	25 559	27 701	-17	-18
Netherlands	-1 500	-1 700	166 050	181 700	-1	-1
New Zealand	-20 569	-13 487	4 907	13 880	-81	-49
Norway	-10 200	-13 637	25 344	24 243	-29	-36
Slovakia	-4 257	-5 116	55 775	43 400	-7	-11
Sweden[f]	-34 368	-30 000	21 077	26 000	-62	-54
Switzerland	-4 360	-5 100	40 710	39 070	-10	-12
United Kingdom[g]	18 776	9 945	602 523	553 283	3	2
United States	-458 750	-428 000	4 506 760	4 786 710	-9	-8

[a] Negative values in Gg denote removal of CO_2. Positive values denote a net source of emissions.

[b] As estimates for 1995 were not available, estimates for the last reported year, 1994, are given in this table.

[c] The Party was not able to provide estimates in the manner provided for in the IPCC Guidelines, however did include in its national communication a detailed description of the model used for estimation of the carbon fluxes in its forests.

[d] A range of estimates of emissions from cultivated peatlands and non-viable drainage areas were included, thus a range for the total estimates from *land-use change and forestry* are given in this table.

[e] The Party did not provide any official estimates, however did include in its national communication a description of the ongoing activities and preliminary estimates from the sector.

[f] As estimates for 1995 were not available, estimates for the last reported year, 1992, are given in this table.

[g] The estimates include emissions and removals from wetland drainage and peat extraction.

Comments

For all the Parties, except the United Kingdom, reporting estimates from *land-use change and forestry* this sector constituted a net sink rather than source. Eight Parties had increased removals from 1990 to 1995, and 4 Parties had lower removals in 1995. For the United Kingdom *land-use change and forestry* was a net source of CO_2 for 1990 and 1995, although only half as much in 1995. When estimates from *land-use change and forestry* are included in total CO_2 emissions, the percentage reduction in emissions ranged from 1 to 81 per cent, and for the United Kingdom the emissions added 2 to 3 per cent to total CO_2 emissions.

All the Parties reported estimates from the category *changes in forests and other woody biomass stocks*, while only four (FRA, GBR, NZL, SWE) reported estimates for *forest and grassland conversion* and only three (AUT, FRA, GBR) for *abandonment of managed land*. Four Parties (AUT, CZE, FRA, SLO) as well reported estimates for the category *other land-use changes*, for the Czech Republic and Slovakia these were emissions from on-site burning. The United Kingdom in general reported an increased sink capacity from this sector in comparison to the first national communication, however, due to the inclusion of new estimates of emissions from conversion of uncultivated land into agriculture and urban use this sector constituted a net source rather than sink as in the first national communication. Finland and the United Kingdom were the only Parties reporting estimates relating to peatlands.

Figure A.5. Percentage reduction or increase of CO_2 emissions with the inclusion of emissions/removals from land-use change and forestry for 1990 and 1995

Table A.6. Anthropogenic emissions of CH_4, 1990 (Gigagrams and percentage of total by Party)

	Energy				Agriculture				Waste		Other[a]		Total
	Fuel Combustion		Fugitive Fuel		Livestock[b]		Other[c]						
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	21	3.6	4	0.7	173	29.4	36	6.0	227	38.7	127	21.6	587
Belgium	16	2.4	53	8.4	374	58.9	15	2.3	174	27.4	4	0.6	634
Canada	47	1.5	1 400	43.5	900	28.0			840	26.1	38	1.2	3 200
Czech Republic	59	6.7	460	51.8	204	23.0			149	16.7	16	1.8	888
Finland[d]	15	6.1			101	41.1			126	51.2	4	1.6	246
France	163	5.4	332	11.0	1 598	53.0	28	0.9	800	26.5	95	3.2	3 017
Germany	205	3.6	1 563	27.5	2 044	36.0			1 870	32.9			5 682
Iceland[d]	0	1.4			12	85.0			2	13.6			14
Ireland	5	0.7	10	1.3	603	74.4	37	4.5	136	16.8	20	2.4	811
Monaco[e]													
Netherlands	33	3.0	179	16.2	505	45.7			379	34.4	8	0.7	1 104
New Zealand	8	0.5	25	1.4	1 513	88.7			155	9.1	5	0.3	1 706
Norway	16	3.7	21	4.9	91	21.1			302	70.1	1	0.2	432
Slovakia	25	6.1	122	29.8	187	45.7			65	15.9	10	2.4	409
Sweden[d]	39	12.0			200	61.7			85	26.2			324
Switzerland	9	3.7	15	6.0	151	62.0			69	28.2	0	0.2	244
United Kingdom	98	2.2	1 298	29.1	1 130	25.3	12	0.3	1 925	43.1			4 464
United States[f]	1 049	3.6	9 961	33.7	8 738	29.6			9 787	33.1			29 710
Total	1 808	3.4	15 442	29.0	18 524	34.7	127	0.2	17 091	32.1	328	0.6	53 472

[a] Includes *industrial processes, solvent use* and *land-use change and forestry*.

[b] Includes source/sink categories: *enteric fermentation* and *animal wastes*.

[c] Includes source/sink categories: *rice cultivation, agricultural soils* and *agricultural waste burning*.

[d] Party did not report estimates for *fugitive fuel emissions*.

[e] Party did not provide estimates but indicated that emissions were negligible.

[f] As Party provided estimates in carbon equivalent, the secretariat converted figures to equivalent CH_4 emissions. Party only reported aggregated emissions from *agriculture* which in addition to emissions from livestock include emissions from *rice cultivation* and *agricultural waste burning*.

Comments

Since only 18 Parties are considered in this compilation and synthesis, total CH_4 emissions reported here represent only 52 per cent of the total of first national communications' inventories. In contrast to the first national communications, the largest source of CH_4 emissions in these second national communications was *agriculture* (*enteric fermentation* and *animal waste*), representing nearly 35 per cent of all CH_4 emissions. *Waste* (solid waste disposal) was the second largest CH_4 source, accounting for 32 per cent, followed by *fugitive fuel emissions* (*oil and natural gas systems* and *coal mining*), 29 per cent. These changes in the shares of the categories are not only a consequence of the recalculation of the 1990 inventory, but are mainly due to the fact that some of the countries having high shares of *fugitive fuel emissions*, such as the Russian Federation, are not considered in this compilation and synthesis.

Livestock was the most important source of CH4 emissions for 10 of the 17 reporting Parties, the proportion ranging from 36 per cent (DEU) to 88.7 per cent (NZL). For three of them (ICE, IRE and NZL) the share of these emissions was higher than 70 per cent. Only two Parties had emissions lower than 25 per cent, the Czech Republic and Norway, the latter having the lowest value with 21 per cent.

Waste was the largest source of CH_4 emissions for four Parties (AUT, FIN, GBR and NOR), the share ranging from 70.1 per cent for Norway to 38.7 per cent for Austria. Five Parties had waste emission shares lower than 25 per cent, with New Zealand having the lowest share, 9.1 per cent. The other eight Parties reporting CH_4 emissions in this category had a share ranging from 26 to 34.4 per cent.

Fugitive fuel emissions also represented a significant share of total CH_4 emissions for some Parties. For Canada, the Czech Republic and the United States this category was the largest source, representing 43.5, 51.8 and 33.7 per cent, respectively, the Czech Republic having the highest proportion. While in Canada *oil and natural gas systems* produced the bulk of those emissions, in the Czech Republic the high share of these emissions resulted from *coal mining*. Another eleven Parties reported *fugitive fuel emissions* from oil/gas or coal production or from both, but the share is not homogeneous. It is less than 10 per cent for six of them and it ranges between 11 and 30 per cent for the remaining five Parties. Finland, Iceland and Sweden did not report CH_4 emissions for this category.

Other emissions were reported by some of the Parties, such as from *industrial processes* (11 Parties) and *land-use change and forestry* (seven Parties). For both categories the proportions are very low, less than 3 per cent. The only exception is Austria, which reported emissions in the *land-use change and forestry* category for the first time in its second national communication, with a share of 22 per cent. These emissions mainly arise from 'managed forests', an item of the CORINAIR methodology. Of the seven Parties reporting CH4 emissions in this category, France and Ireland used this methodology as well, both of them also having higher shares than the rest of the reporting Parties.

Information was scarcer on CH_4 emissions in the *agriculture* sector other than from livestock. Four Parties (AUT, BEL, FRA and IRE) reported emissions from *agricultural soils*, but their share of total CH_4 emissions is less than 6 per cent. Emissions from *rice cultivation* were reported by France and the United States, with shares of less than 2 per cent. Four Parties (AUT, GBR, IRE and NZL) presented emissions from *agricultural waste burning*, but with shares less than 0.3 per cent these emissions are very low and in some cases negligible.

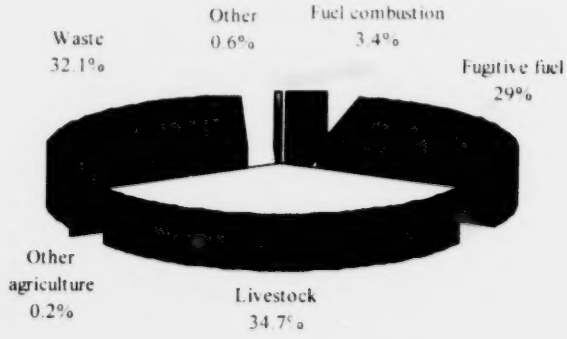

Figure A.6 Distribution of CH_4 emissions by source categories, 1990

Table A.7. Anthropogenic emissions of CH_4, 1995 (Gigagrams and percentage of total by Party)

	Energy				Agriculture				Waste		Other[a]		Total
	Fuel Combustion		Fugitive Fuel		Livestock[b]		Other[c]						
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	19	3.4	5	0.9	173	29.8	36	6.2	220	37.9	127	21.9	580
Belgium[d]	14	2.2	45	7.0	375	59.0	14	2.3	184	29.0	3	0.5	635
Canada	43	1.2	1 791	48.0	996	26.7			889	23.8	13	0.3	3 732
Czech Republic	32	4.4	405	55.2	139	18.9			144	19.7	13	1.8	733
Finland[e]	16	6.6			88	36.5			133	55.2	4	1.7	241
France	187	6.6	333	11.7	1 520	53.4	31	1.1	678	23.9	95	3.3	2 844
Germany[f]	119	2.5	1 170	24.1	1 660	34.2			1 900	39.2			4 849
Iceland	0	1.5			11	81.6			2	16.9			14
Ireland	4	0.5	11	1.4	607	74.6	29	3.6	138	17.0	24	3.0	812
Monaco[g]													
Netherlands	31	2.9	170	16.0	475	44.7			380	35.7	7	0.7	1 063
New Zealand	8	0.5	27	1.7	1 460	89.3			132	8.1	8	0.5	1 635
Norway	20	4.3	30	6.4	96	20.5			322	68.7	1	0.2	469
Slovakia	15	4.7	107	33.9	122	38.6			63	19.9	9	2.8	316
Sweden[e]	38	12.8			197	66.7			61	20.6			296
Switzerland	8	3.3	13	5.4	148	62.8			67	28.3	0	0.2	235
United Kingdom	83	2.2	843	22.1	1 104	28.9			1 786	46.8			3 817
United States	801	2.6	9 347	30.2	9 079	29.3	489	1.6	11 259	36.3			30 975
Total	1 439	2.7	14 296	26.8	18 251	34.3	601	1.1	18 358	34.5	305	0.6	53 246

[a] Includes *industrial processes*, *solvent use* and *land-use change and forestry*.
[b] Includes source/sink categories: *enteric fermentation* and *animal wastes*.
[c] Includes source/sink categories: *rice cultivation*, *agricultural soils* and *agricultural waste burning*.
[d] As Party did not provide estimates for 1995, estimates for 1994 are given in this table.
[e] Party did not report estimates for *fugitive fuel emissions*.
[f] As Party only provided an aggregate estimate for 1995, estimates for 1994 are given in this table.
[g] Party did not provide estimates but indicated that emissions were negligible.

Comments

Since only 18 Parties are considered in this compilation and synthesis, total CH_4 emissions reported here represent only 52 per cent of the aggregated CH_4 emissions of the first national communications' 1990 inventories. Therefore, changes in the relative shares of the categories are not only a consequence of new trends, but are also due to the fact that some of the countries having significant shares in some categories, such as the Russian Federation, are not considered here. The largest sources of CH_4 emissions were *waste* (solid waste disposal) and *agriculture* (*enteric fermentation* and *animal waste*), both representing 34 per cent of total CH_4 emissions, (34.6 and 34.4 per cent, respectively). *Fugitive fuel emissions* (from *oil and natural gas systems* and *coal mining*) accounted for 29.9 per cent of the total.

For six Parties (AUT, DEU, GBR, FIN, NOR and USA), *waste* was the most important source of CH_4 emissions ranging from 69 per cent for Norway to 36 per cent for the Unites States. For eight Parties the share of emissions from solid waste disposal was lower than 25 per cent, with New Zealand having the lowest share, 8 per cent. The three remaining Parties had a share ranging from 28 to 36 per cent.

Although total CH_4 emissions from livestock (*enteric fermentation* and *animal waste*) were slightly lower than those from *waste*, livestock was the largest source of CH_4 emissions for nine of the 17 reporting Parties. Their share ranged from 39 (SLO) to 89 per cent (NZL). For three of them the share of these emissions was higher than 70 per cent. Only two Parties had shares lower than 25 per cent, the Czech Republic and Norway, the former having the lowest value, 19 per cent.

Fugitive fuel emissions also represented a significant share of total CH_4 emissions for some Parties. For Canada and the Czech Republic this category was the largest source, representing 48.0 and 55.2 per cent, respectively. While in Canada *oil and natural gas systems* produced the bulk of these emissions, in the Czech Republic the high share of these emissions resulted from *coal mining*. Another 12 Parties reported *fugitive fuel emissions* from oil/gas or coal production or from both, but the share is not homogeneous. It is less than 10 per cent for six of them and it ranges between 12 and 34 per cent for the other six. Finland, Iceland and Sweden did not report CH_4 emissions in this category.

In the *agriculture* sector some Parties reported CH_4 emissions other than from *enteric fermentation* and *animal waste*, such as from *agricultural soils* and *rice cultivation*. Emissions from *agricultural soils* were reported by four Parties (AUT, BEL, FRA and IRE), but their shares of total CH_4 emissions were less than 6 per cent of the total. *Rice cultivation* emissions were reported by France and the United States with low shares as well, less than 2 per cent.

Other emissions were reported such as from *industrial processes* (11 Parties) and *land-use change and forestry* (seven Parties). For both sectors the values are low, for most of them less than 3 per cent. The only exception is Austria, presenting a share of 22 per cent in the *land-use change and forestry* sector arising from 'managed forests', an item of the CORINAIR methodology. Of the seven Parties reporting emissions in this category, France and Ireland used this methodology as well, both of them also having higher shares than the rest of the reporting Parties.

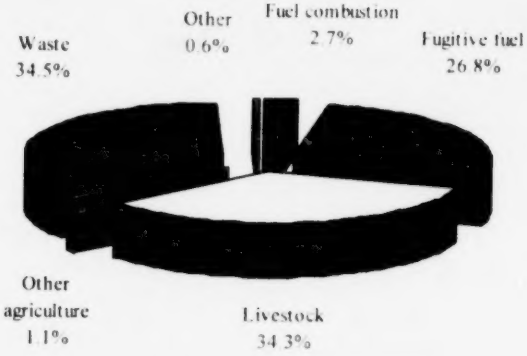

Figure A.7 Distribution of CH_4 emissions by source categories, 1995

Table A.8. Anthropogenic emissions of N_2O, 1990 (Gigagrams and percentage of total by Party)

	Energy				Industrial Processes		Agriculture[a]		Waste		Other[b]		Total
	Transport		Other[c]										
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	3.1	27.0	1.4	11.7	0.6	5.2	3.3	28.5	0.0	0.1	3.4	29.1	711.6
Belgium	0.9	3.0	7.4	24.0	11.5	37.3	10.9	35.4	0.1	0.3			30.8
Canada	29.0	33.4	6.8	7.8	37.0	42.7	11.0	12.7	0.1	0.1	2.6	3.0	86.0
Czech Republic	0.8	3.1	19.2	74.4	3.3	12.8	2.3	8.9			0.2	0.8	25.8
Finland	2.0	11.1	3.0	16.7	3.0	16.7	10.0	55.6					18.0
France	4.0	2.2	10.3	5.7	90.0	49.5	54.5	30.0	3.1	1.7	19.8	10.9	181.7
Germany	11.0	4.9	26.0	11.5	83.0	36.7	96.0	42.5	4.0	1.8	6.0	2.7	226.0
Iceland	0.0	4.8	0.0	4.8	0.2	38.1	0.2	52.4					0.4
Ireland	0.2	0.6	2.6	8.6	2.6	8.7	23.3	77.8	0.6	2.1	0.6	2.1	29.4
Monaco[d]													
Netherlands	4.9	9.6	0.6	1.2	18.6	36.3	22.2	43.4	0.6	1.2	4.3	8.4	51.2
New Zealand	0.4	0.8	2.3	4.8			44.9	94.4			0.0	0.1	47.5
Norway	1.0	6.7	1.0	6.7	7.0	46.7	6.0	40.0					15.0
Slovakia	0.0	0.0	0.6	4.8	2.1	16.8	9.5	76.0	0.3	2.4			12.5
Sweden	2.6	28.3	3.7	40.2	2.7	29.3	0.2	2.2					9.2
Switzerland	1.1	9.8	0.3	2.2	0.3	2.8	9.2	80.2	0.2	1.9	0.3	3.0	11.5
United Kingdom	3.4	2.8	11.3	9.4	94.0	78.6	10.4	8.7	0.4	0.4			120.0
United States[e]	130.2	30.5			94.7	22.2	201.3	47.2					426.2
Total	194.7	14.9	96.3	7.4	450.6	34.6	515.2	39.5	9.5	0.7	37.3	2.9	1 302.8

[a] Includes source/sink categories: *rice cultivation*, *agricultural soils* and *agricultural waste burning*.

[b] Includes *solvent use* and *land-use change and forestry*.

[c] Includes *fugitive fuel emissions* and *fuel combustion* emissions other than *transport*.

[d] Party did not provide estimates but indicated that emissions were negligible.

[e] As Party provided estimates in carbon equivalent, the secretariat converted figures to equivalent N_2O emissions. Party only reported aggregated emissions from *fuel combustion*, this estimate is included under *transport* in this table.

Comments

As in the 1990 inventory of first national communications, *agriculture* (fertilizer use) was identified as the largest source of N_2O emissions, followed by *industrial processes* and *energy* (*transport* and other).

Agriculture represented 39.5 per cent of total N_2O emissions, proportions ranging from 94.4 per cent (New Zealand) to 2.2 per cent (Sweden). It was the largest source of emissions for nine of the reporting Parties, accounting for more than 50 per cent of total N_2O emissions for most of them. Only for three Parties were the shares lower than 10 per cent: the Czech Republic (8.9 per cent), Sweden (2.2 per cent) and the United Kingdom (8.7 per cent). Although all Parties reported emissions from the use of nitrogenous fertilizer and manure, there was in general a high level of uncertainty associated with these estimates. Monaco did not report N_2O emissions, as it stated that they are negligible.

Industrial processes were the second greatest source of N_2O emissions, representing 34.6 per cent of aggregated emissions. In this sector the reporting quality was for most of them higher than for *agriculture*. For five Parties (BEL, CAN, FRA, GBR and NOR) *industrial processes* constituted the largest source of emissions, ranging from 78.6 per cent (United Kingdom) to 37.3 per cent (Belgium) of their total emissions. For the remaining Parties proportions ranged from 38.1 per cent (Iceland) to 2.8 per cent (Switzerland). New Zealand did not report N_2O emissions from *industrial processes*, in spite of the fact that it has fertilizer production. N_2O emissions from the *inorganic chemicals* category were specifically reported by 14 Parties, whilst two Parties reported those emissions without specifying the category. N_2O emissions from organic chemical industries were specifically reported by five Parties (CAN, DEU, FRA, GBR and USA).

The *energy* sector accounted for 22.3 per cent of total N_2O emissions, *transport* 14.9 per cent and the other energy category 7.4 per cent. As with *industrial processes*, the estimates for the *energy* sector were of medium quality but as with other categories the quality and uncertainty varied amongst Parties. Emission estimates in the *transport* category vary widely, from values as low as 0.6 per cent (Ireland) to as high as 33.4 per cent (Canada). Although it does not constitute the largest source for any of the Parties, for four of them (AUT, CAN, SWE and USA) this category represented an important source, with shares higher than 25 per cent. For Slovakia emissions from this sector were negligible. Energy-related emissions other than from *transport* were identified as the largest source of total N_2O emissions for two Parties, the Czech Republic and Sweden, with shares of 74.4 and 40.2 per cent, respectively. For the remaining Parties proportions ranged from 1.2 per cent (Netherlands) to 24 per cent (Belgium).

The emissions from the other energy category for the majority of Parties were from the *energy and transformation industries* and *industry* categories.

Other N_2O emission sources were reported, such as the *land-use change and forestry* and *solvent use* sectors. Six Parties (AUT, CAN, CZE, FRA, IRE and NZL) reported emissions from *land-use change and forestry*, with shares ranging from 23 per cent (Austria) to 0.1 per cent (New Zealand). Canada reported N_2O emissions from prescribed burning, the Czech Republic from on-site burning of cleared forests, and New Zealand from *forest and grassland conversion*, but for all of them emissions were less than 3 per cent. Now, these kinds of emissions are included in the *forest and grassland conversion* category in the Revised 1996 IPCC Guidelines. The other three Parties reporting N_2O emissions in *land-use change and forestry* used the CORINAIR methodology to gather their inventory data. Two of them, Austria and France, have the highest share in this category, with shares of 23 and 10 per cent, respectively and for Austria, this category constituted the highest proportion of its aggregated N_2O emissions. Reported emissions for the category *other land use change activities*. Emissions from *solvent use* were presented also by six Parties (AUT, CAN, CHE, DEU, FRA and NDL), but they accounted for a small share (less than 3 per cent) of total N_2O emissions for most of them.

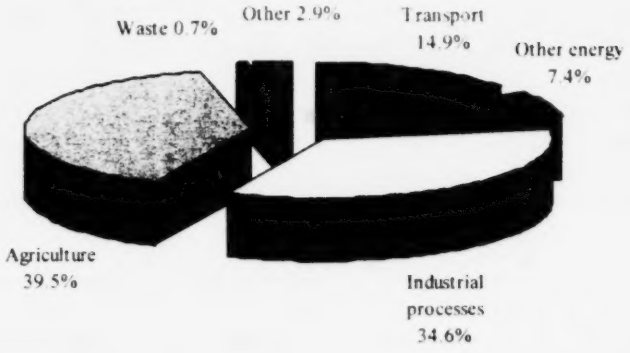

Figure A.8 Distribution of N_2O emissions by source categories, 1990

Table A.9. Anthropogenic emissions of N_2O, 1995 (Gigagrams and percentage of total by Party)

	Energy				Industrial Processes		Agriculture[a]		Waste		Other[b]		Total
	Transport		Other[c]										
	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)	%	(Gg)
Austria	4.3	34.0	1.2	9.2	0.6	4.3	3.3	26.1	0.0	0.1	3.4	26.4	12.8
Belgium[d]	1.2	3.7	7.8	24.2	12.3	38.2	10.8	33.5	0.1	0.3			32.3
Canada	48.0	44.5	7.4	6.9	37.1	34.4	13.3	12.3	0.2	0.2	1.8	1.7	107.8
Czech Republic	1.0	4.6	15.3	70.8	3.4	15.7	1.7	7.9			0.1	0.5	21.6
Finland	2.0	11.1	4.0	22.2	3.0	16.7	9.0	50.0					18.0
France	6.7	3.9	10.3	5.9	80.4	46.3	52.6	30.3	3.7	2.1	19.8	11.4	173.5
Germany[e]	19.0	9.1	24.0	11.5	81.0	38.8	86.0	41.1					219.0
Iceland	0.0	10.0	0.0	5.0	0.1	35.0	0.2	47.5					0.4
Ireland	0.5	1.9	3.0	11.6	2.6	10.1	19.1	73.4			0.8	3.0	26.0
Monaco[f]													
Netherlands	7.7	13.2	0.7	1.2	18.1	30.9	26.9	46.0	0.8	1.4	4.3	7.4	58.5
New Zealand	0.5	1.0	2.0	4.4			44.1	94.5			0.1	0.1	46.7
Norway	1.0	7.7	1.0	7.7	5.0	38.5	6.0	46.2					14.0
Slovakia	0.3	3.9	0.5	6.5	1.1	14.3	5.4	70.1	0.4	5.2			7.8
Sweden	2.9	31.3	3.9	41.6	2.3	24.5	0.2	2.2					9.2
Switzerland	1.8	15.1	0.3	2.1	0.3	2.6	8.8	74.6	0.3	2.4	0.4	3.2	11.8
United Kingdom	8.3	8.8	12.5	13.3	63.7	67.3	9.7	10.3	0.4	0.5			95.0
United States	109.0	23.3	36.0	7.7	105.0	22.5	217.1	46.5					467.0
Total	214.2	16.4	129.9	9.9	415.9	31.8	514.3	39.3	5.9	0.4	30.6	2.3	1 321.4

[a] Includes source/sink categories: *rice cultivation, agricultural soils* and *agricultural waste burning*.
[b] Includes *solvent use* and *land-use change and forestry*.
[c] Includes *fugitive fuel emissions* and *fuel combustion* emissions other than *transport*.
[d] As Party did not provide estimates for 1995, estimates for 1994 are given in this table.
[e] As Party only provided an aggregate estimate for 1995, estimates for 1994 are given in this table.
[f] Party did not provide estimates but indicated that emissions were negligible.

Comments

The largest source of N_2O emissions was *agriculture* (fertilizer use), followed by *industrial processes* and *energy* (*transport* and other).

Agriculture represented 39.3 per cent of total N_2O emissions, proportions ranging from 94.5 per cent (NZL) to 2.2 per cent (SWE). For 10 of the 17 Parties reporting N_2O emissions, *agriculture* was the largest source, accounting for more than 50 per cent of total N_2O emissions in most cases. Only two Parties reported shares of less than 10 per cent: the Czech Republic (7.9 per cent) and Sweden (2.2 per cent). Although all Parties, except Monaco, reported emissions from the use of nitrogenous fertilizer and manure, there was in general a high level of uncertainty associated with these estimates. Monaco did not report N_2O emissions, as it stated that they were negligible.

Industrial processes were the second greatest source of N_2O emissions, representing 31.8 per cent of aggregated emissions. In this sector the level of uncertainty reported by the Parties was for most of them lower than for *agriculture*. For three Parties (BEL, FRA and GBR) *industrial processes* constituted the largest source of emissions, with shares of 38.2, 46.3 and 67.3 per cent, respectively. For the remaining Parties proportions ranged from 38.8 per cent (Germany) to 2.6 per cent (Switzerland). As in the 1990 inventory New Zealand did not report N_2O emissions from *industrial processes*. N_2O emissions from the *inorganic chemicals* category were reported by 14 Parties, whilst two Parties reported these emissions without specifying the category. N_2O emissions from organic chemical industries were specifically reported by five Parties (CAN, DEU, FRA, GBR and USA).

The *energy* sector accounted for 26.3 per cent of aggregated N_2O emissions, *transport* 16.4 per cent and the "other" energy category 9.9 per cent. As with *industrial processes*, the estimates for the *energy* sector were of medium quality but as with other categories the quality and uncertainty varied amongst Parties. Four Parties reported energy as the largest source of emissions. For two of them, Austria (34.0 per cent) and Canada (44.5 per cent) *transport* constituted the highest share of their aggregated N_2O emissions. For the other Parties reporting emissions from *transport*, estimates varied widely, from as low as 1.0 per cent (New Zealand) to as high as 31 per cent (Sweden). The energy-related emissions other than from *transport* ranged from 70.8 per cent (Czech Republic) to 1.2 per cent (Netherlands). Apart from the Czech Republic, Sweden (41.6 per cent) also had its largest share of N_2O emissions in the "other" energy category. In both cases those emissions came from the *energy and transformation industries* as well as from the *industry* category.

Other N_2O emissions were reported by some countries, such as from the *solvent use* and the *land-use change and forestry* sectors. Emissions from the latter sector were reported by six countries (AUT, CAN, CZE, FRA, IRE and NZL), with shares ranging from 20 per cent (Austria) to less than 1 per cent (New Zealand). Canada reported N_2O emissions from prescribed burning, the Czech Republic from on-site burning of cleared forests, and New Zealand from *forest and grassland conversion*, but for all of them emissions were less than 3 per cent. Now, these kinds of emissions are included in the *forest and grassland conversion* category of the Revised 1996 IPCC Guidelines. The other three Parties reporting N_2O emissions in *land-use change and forestry* used the CORINAIR methodology to gather their inventory data. Among the Parties, Austria and France have the highest share in this sector, with shares of about 20 and 10 per cent, respectively. These three Parties also reported emissions for the category: *other land-use change activities*. Five Parties (AUT, CAN, CHE, FRA and NLD) presented emission estimates from *solvent use*, but they accounted for a small share (less than 3 per cent) of total N_2O emissions.

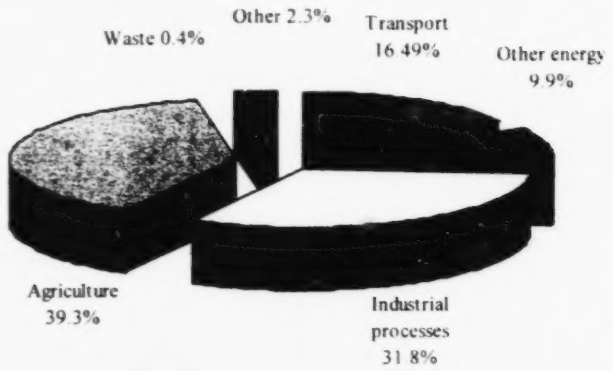

Figure A.9 Distribution of N_2O emissions by source categories, 1990

Table A.10. Anthropogenic emissions of other greenhouse gases, 1990 and 1995[a]
(Gigagrams of CO_2 equivalent, percentage relative to 1990, 1990=100 per cent)

	HFCs[b]			PFCs[c]			SF_6			Total		
	1990	1995		1990	1995		1990	1995		1990	1995	
	Gg	Gg	%	Gg	Gg	%	Gg	Gg	%	Gg	Gg	%
Austria					7.7						7.7	
Belgium		585		68	68	100	478	478	100	546	1 131	207
Canada		500		5 936	6 019	101	2 868	1 888	66	8 804	8 407	95
Czech Republic		1									1	
Finland		79			~0			96			175	
France	2 970			2 002			141			5 113		
Germany	260	2 878	1 107	2 693	1 665	62	3 895	5 998	154	6 849	10 542	154
Iceland		13.7		312	54	18	5	5	100	318	74	23
Netherlands	4 910	8 452	172	2 458	2 391	97	1 386	1 457	105	8 755	12 302	141
New Zealand		183		601	196	33	552	4 368	791	1 153	4 748	412
Norway		244		2 545	1 441	57	2 198	573	26	4 744	2 259	48
Slovakia				499	321	64				499	321	64
Sweden		195		400	390	98	956	1 242	130	1 356	1 827	135
Switzerland		260			66			717			1 043	
United Kingdom	1 366	2 545	186	2 085	569	27	621	813	131	4 073	3 027	96
United States	44 040	76 652	174	18 350	29 186	159	25 690	30 831	120	88 080	136 669	155

[a] With the exception of Canada, the Netherlands, the United Kingdom and the United States, which reported actual emissions, and Belgium, Iceland and Slovakia, which reported potential emissions, Parties did not indicate clearly whether emissions reported are potential or actual ones.

[b] Belgium, Finland, Germany, Iceland, New Zealand and the United Kingdom only reported aggregated data for HFC figures. The secretariat therefore assumed that all these emissions were HFC-134a.

[c] Belgium, Finland, Iceland, New Zealand and the United Kingdom reported only aggregated PFC figures. The secretariat therefore assumed that approximately 90 per cent was CF_4 and 10 per cent C_2F_6.

Comments

16 Parties reported on emissions of HFCs, PFCs and SF_6, although not always for all years and gases. Of the 11 Parties which reported emissions for 1990 and 1995, for 6 Parties total emissions of these gases (in CO_2 equivalent) have increased from 1990 to 1995, ranging from 35 to 312 per cent higher than 1990 levels. For five Parties total emissions of these gases have decreased, ranging from 67 to 4 per cent lower than 1990. The contribution of these gases to total greenhouse gases is significant for some Parties, 2 to 6 per cent in 1995, and for several Parties this share has increased since 1990.

Although total emissions of these gases have increased for several Parties, the trends in the individual gases has varied for some of these gases amongst Parties. Only two Parties reported increases in the levels of PFCs, while the vast majority reported decreasing emissions, for a few Parties quite substantial decreases. Emissions of SF_6 varied, with six Parties reporting increased emissions and four decreasing or stable emissions. Emissions of HFCs in contrast to PFCs and SF_6, were increasing for all reporting Parties, with many Parties reporting on the increasing use of HFCs as replacements for ozone-depleting substances.

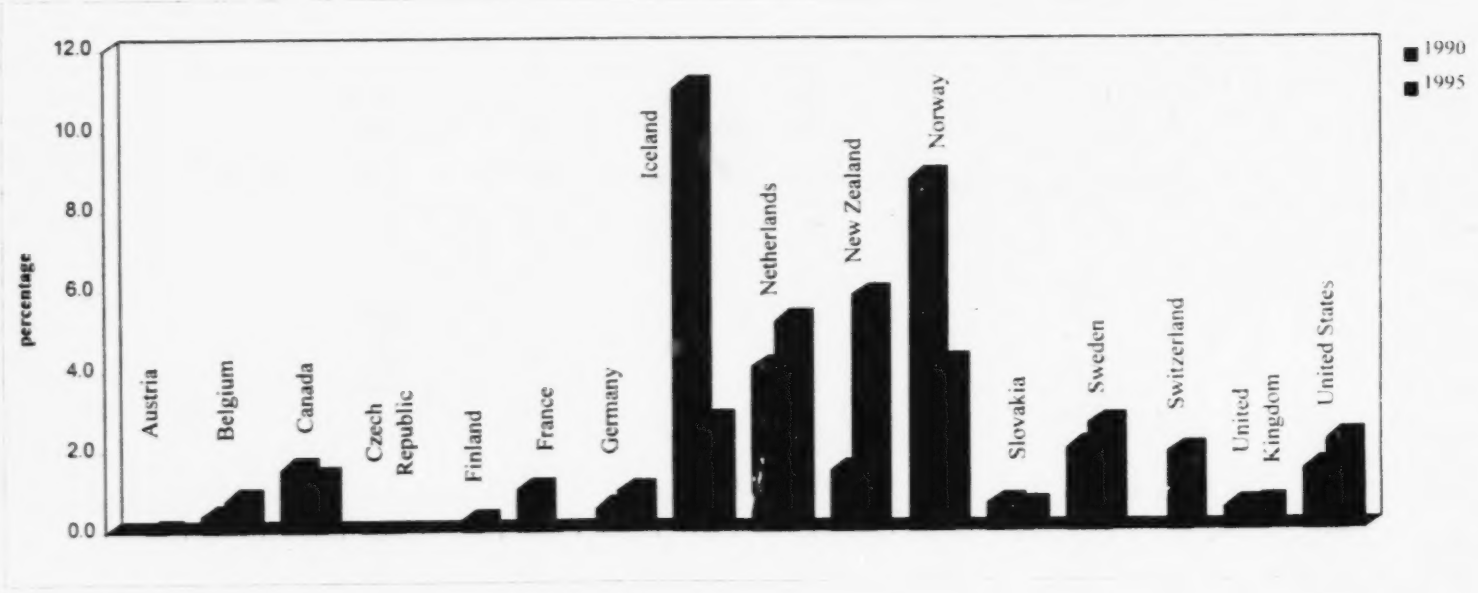

Figure A.10 Contribution of HFCs, PFCs and SF_6 to total greenhouse gases, 1990 & 1995

Table A.11. Anthropogenic CO_2 emissions from international bunkers, 1990-1995 (Gigagrams and percentage)

	Percentage relative to 1990, 1990=100						Last Reported Value	
	1990 (Gg)	1991 %	1992 %	1993 %	1994 %	1995 %	1994 (Gg)	1995 (Gg)
Austria	890	117	125	121	128	136		1 210
Belgium	15 726	102	106	107	102	99		15 555
Canada[a]	5 133	94	94	87	92	94		4 814
Czech Republic[b]								
Finland	2 800		107	89	76	66		1 850
France	17 485	96	98	102	92	96		16 815
Germany	19 569	92	91	103	103		20 100	
Iceland	319	81	83	92	96	118		377
Ireland	1 172	112	96	132	115	129		1 510
Monaco[c]								
Netherlands	40 400	103	106	110	107	110		44 600
New Zealand	2 413	92	92	94	116	113		2 736
Norway	1 800	78	106	111	117	128		2 300
Slovakia[b]								
Sweden	4 207	103	114	115	128	128		5 367
Switzerland	2 160	102	104	106	108	113		2 430
United Kingdom	19 341	99	107	113	113	120		23 243
United States[b]								

[a] Party reported aggregate emissions from bunker fuels for CO_2, CH_4 and N_2O in CO_2 equivalent for the years 1990 to 1995, which are given here. A figure for CO_2 emissions from bunker fuels for 1995 was also provided, which was 4,640 Gg, approximately 96 per cent of the aggregate emissions of CO_2, CH_4 and N_2O in 1995.

[b] Party did not provide estimates.

[c] Party reported emissions as negligible.

Comments

All reporting Parties except the Czech Republic, Monaco, Slovakia and the United States reported CO_2 emissions from bunker fuel. The majority of the Parties reported increases in emissions from 1990 to 1995. For the ten Parties which reported increases in emissions over th · period, the range was from 13 to 36 per cent over the 1990 level. These increases are higher in percentage than the reported increases in total CO_2 emissions. Four reporting Parties (BEL, CAN, DEU, FRA) reported a decrease, ranging from 1 per cent (Belgium) to 34 per cent (France). For the majority of the Parties reporting increases in 1995 there was a discernible upward trend in emissions throughout the period. The emissions from international bunkers, although not included in national totals for most Parties, were equivalent to 1 to 11 per cent of total CO_2 emissions, except for Belgium, Iceland and the Netherlands, whose emissions represented 13, 18 and 27 per cent, respectively.

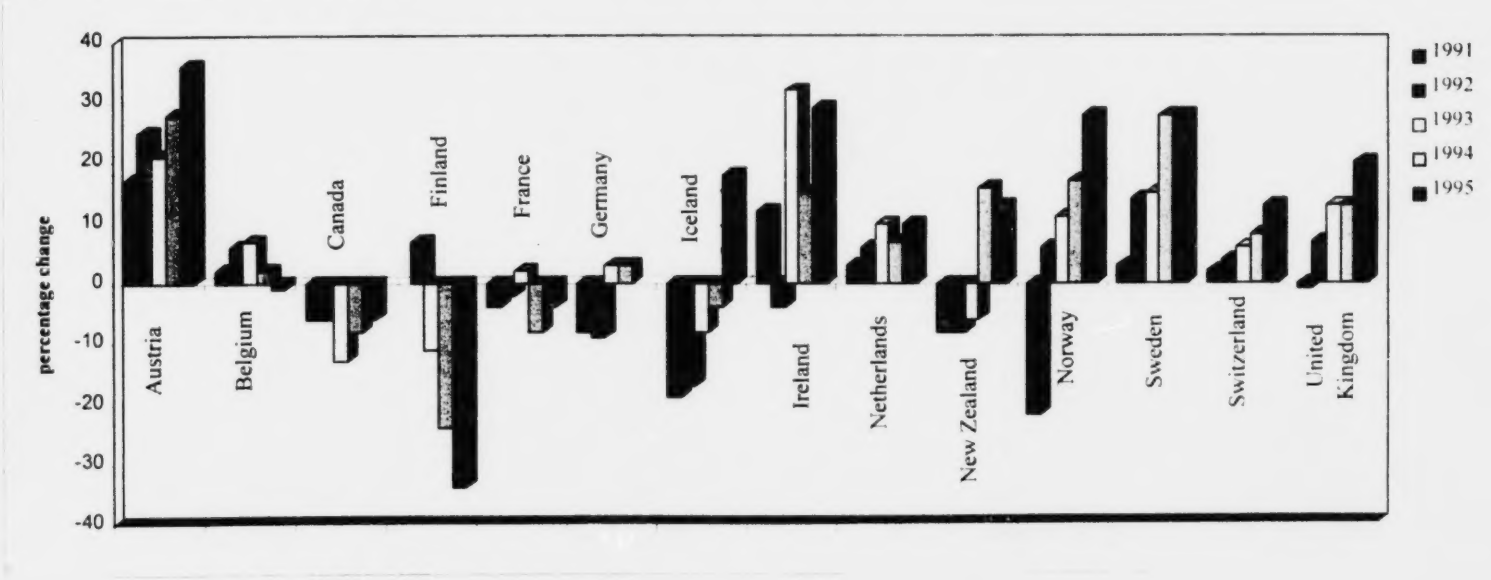

Figure A.11 Trend in CO_2 emissions from international bunkers, 1990 to 1995 (percentage change, 1990 = 0)

Table A.12. Anthropogenic emissions of precursor gases and SO_2, 1990 and 1995 (Gigagrams)

	Precursor gases						SO_2	
	CO		NO_x		NMVOC			
	1990	1995	1990	1995	1990	1995	1990	1995
Austria	1 333	1 146	197	176	491	406		
Belgium[a]	1 127	1 252	339	345	331	321		
Canada[b]								
Czech Republic	1 055	874	742	413	311	241		
Finland	487	434	295	259	213	182	260	96
France	11 354	9 469	1 909	1 778	3 156	2 770	1 348	1 048
Germany[a]	10 743	6 738	2 640	2 211	3 155	2 135	5 326	2 995
Iceland	58	49	26	28	13	12	24	24
Ireland	429	295	115	118	180	170		
Monaco[c]								
Netherlands	1 072	873	574	518	444	364	203	147
New Zealand	704	797	113	134	179	201	16	21
Norway	961	829	227	222	299	378	53	35
Slovakia	537	438	229	191	149	153	543	262
Sweden	1 211	1 089	335	308	526	457		
Switzerland	707	510	163	134	281	200	42	34
United Kingdom	7 374	5 474	2 867	2 259	2 618	2 252	3 752	2 630
United States[d]		82 930		19 728		20 624		16 600

[a] As estimates for 1995 were not available, estimates for the last reported year, 1994, are given in this table.
[b] The Party did not provide estimates, although stated that the information would be provided in a separate addendum to its second national communication.
[c] The Party reported emissions as negligible.
[d] The Party only provided estimates for 1995.

Comments

All Parties except Canada and Monaco reported emissions of precursor gases. There is a decreasing trend in these emissions for almost all reporting Parties. For the 15 Parties which reported emissions in 1990 and 1995, ten Parties reported decreases for all the precursors. Only New Zealand reported an increase of the emissions for the three precursors; Belgium for CO and NO_X; Iceland for NO_X and Norway and Slovakia for NMVOC. In general the magnitude of these increases are lower than the reported decreases. For the Parties which reported estimates for 1990 and 1995, taken together their total emissions of CO, NO_X and NMVOC have decreased 23, 16 and 17 per cent, respectively.

Although some Parties had reported emissions of SO_2 in the first national communications, the guidelines have only recently requested Parties to report such emissions. 11 Parties reported estimates of SO_2 emissions, although the United States only reported for the year 1995. Eight Parties reported lower emissions in 1995 than 1990, while only one Party (New Zealand) reported an increase. For the 10 Parties reporting SO_2 emissions for 1990 and 1995, their emissions as a whole have decreased 37 per cent.

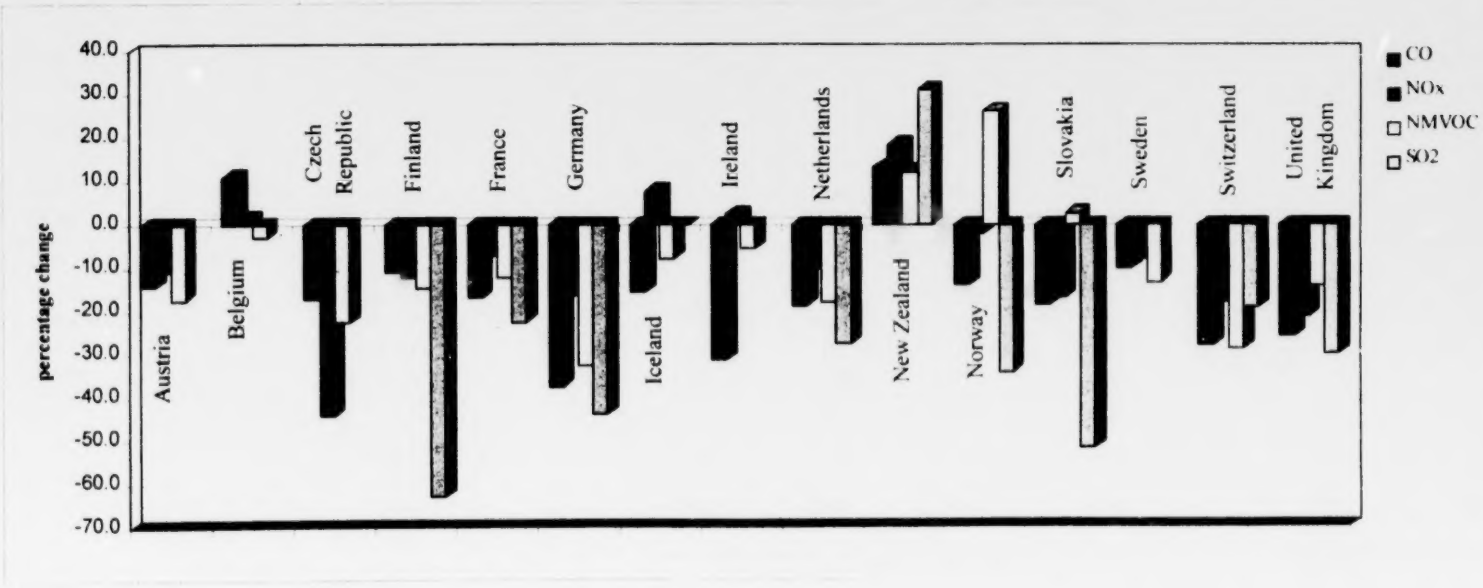

Figure A.12 Percentage change in CO, NO_X, NMVOC and SO_2 emissions from 1990 to 1995 (1990 = 0)

Table B.1. Total anthropogenic CO_2 emissions, excluding land-use change and forestry, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last Reported Value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	61 880	107	97	96	96	100		62 020
Belgium	116 090	103	102	99	104		121 297	
Canada	464 000	98	101	101	104	108		499 526
Czech Republic	165 490	93	85	81	77	78		128 817
Finland[a]	53 800		97	99	110	104		56 050
France	378 379	106	106	99	99	102		385 347
Germany	1 014 155	96	91	91	89	88		894 500
Iceland	2 147	96	102	107	105	106		2 282
Ireland	30 719	103	105	104	108	110		33 931
Monaco[b]	71							129
Netherlands	167 550	104	103	105	105	109		183 400
New Zealand	25 476	102	110	107	107	107		27 367
Norway	35 544	95	97	101	106	107		37 880
Slovak Republic	60 032	88	81	77	72	81		48 516
Sweden	55 445	100	101	101	106	105		58 108
Switzerland	45 070	104	101	98	96	98		44 170
United Kingdom	583 747	101	98	95	95	93		543 338
United States[c]	4 965 510	99	100	103	104	105		5 214 710

[a] Party did not provide estimate for 1991.

[b] As Party did not provide estimate for 1995, but for 1996, this estimate is given in the table. The trend in emissions is not given here since the estimate for 1990 includes only emissions from waste while the estimate for 1995 includes emissions from waste and fuel combustion.

[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CO_2 emissions.

Comments

The trend in CO_2 emissions since 1990 has not been homogeneous for all Parties, although the majority of Parties reported increases in CO_2 emissions in 1995 in comparison to 1990. For those Parties which reported increases in emissions over the period, the proportions ranged from 2 to 10 per cent. For the five Parties (CHE, CZE, DEU, GBR, SLO) reporting lower emissions in 1995 than in 1990, the decreases ranged from 22 to 2 per cent. For the group as a whole, emissions increased by 1.4 per cent over the period.

For a number of Parties emissions declined slightly in the initial years subsequent to 1990, only to increase afterwards. For a few Parties (AUT, CHE, FRA) emissions seem to have fluctuated around the levels of 1990. Germany was the only Party reporting continually decreasing emissions since 1990 while the United Kingdom has had decreasing emissions since 1991. The Czech Republic and Slovakia, although having reported the largest decrease in emissions for the period, witnessed a slight growth in emissions in 1995 in comparison to 1994.

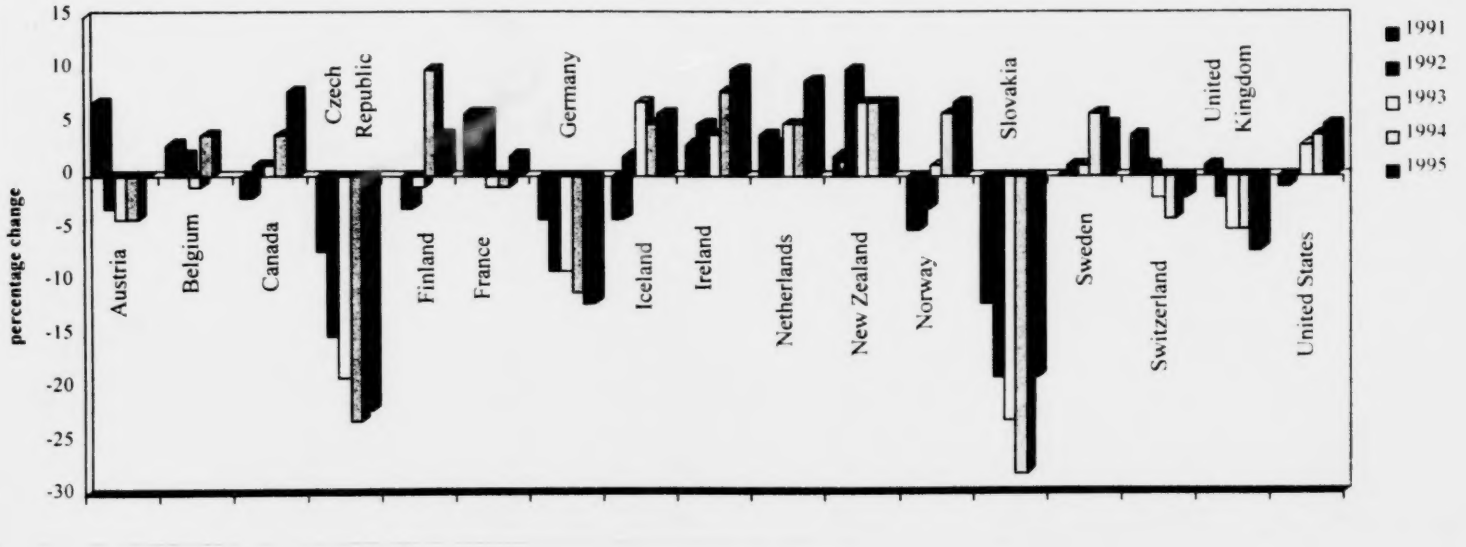

Figure B.1. Trend in total CO_2 emissions, 1990 to 1995 (percentage change, 1990 = 0)

Table B.2. CO_2 emissions from fuel combustion, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	46 490	110	99	98	98	103		47 950
Belgium	105 919	103	102	99	104	104		109 936
Canada	426 000	98	101	101	104	108		460 886
Czech Republic	160 073	93	85	82	77	78		124 647
Finland[a]	52 600		98	99	111	105		55 130
France	356 259	106	105	100	98	100		356 588
Germany	986 640	96	91	91	89	88		869 300
Iceland	1 674	97	105	108	106	106		1 774
Ireland	29 038	103	105	104	108	111		32 105
Monac[b]								78
Netherlands	164 800	104	103	105	105	109		180 400
New Zealand	22 474	101	110	106	107	107		24 004
Norway	26 938	97	100	104	109	107		28 854
Slovak Republic	56 585	88	81	77	71	80		45 426
Sweden	51 329	100	101	101	105	104		53 385
Switzerland	40 330	105	102	99	97	100		40 130
United Kingdom	571 199	100	97	95	93	92		525 582
United States[c]	4 903 120	99	100	103	104	105		5 144 626

[a] Party did not provide estimate for 1991.

[b] As Party did not provide estimate for 1995, but for 1996, this estimate is given in the table. The trend in emissions is not given here since only an estimate for the last reported year was provided.

[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CO_2 emissions.

Comments

As *fuel combustion* accounts for more than 90 per cent of CO_2 emissions for the vast majority of Parties, the trend in CO_2 emissions from *fuel combustion* is similar to that of total CO_2 emissions, with 11 Parties having increased emissions in 1995 in comparison to 1990. For the 12 Parties reporting increased emissions over the period, the increase was from 3 to 11 per cent. For the four Parties with emissions in 1995 lower than 1990, the decrease in emissions ranged from 22 to 8 per cent. For France and Switzerland emissions in 1995 were approximately equivalent to 1990 levels. For all the Parties taken together, emissions from *fuel combustion* grew by 1.2 per cent from 1990 to 1995

The trend in emissions from year to year varied over the period and amongst Parties. For the majority of Parties reporting increasing emissions over the period, the trend, although upward, fluctuated to some degree from year to year on account of various national circumstances, in particular economic conditions. The increase was due mostly to increasing emissions from *transport* and from the *energy and transformation* sectors. For the Parties with lower emissions in 1995, the decrease from year to year seems to have subsided in the latter half of the period, with the Czech Republic and Slovakia actually reporting increases in emissions from 1994 to 1995.

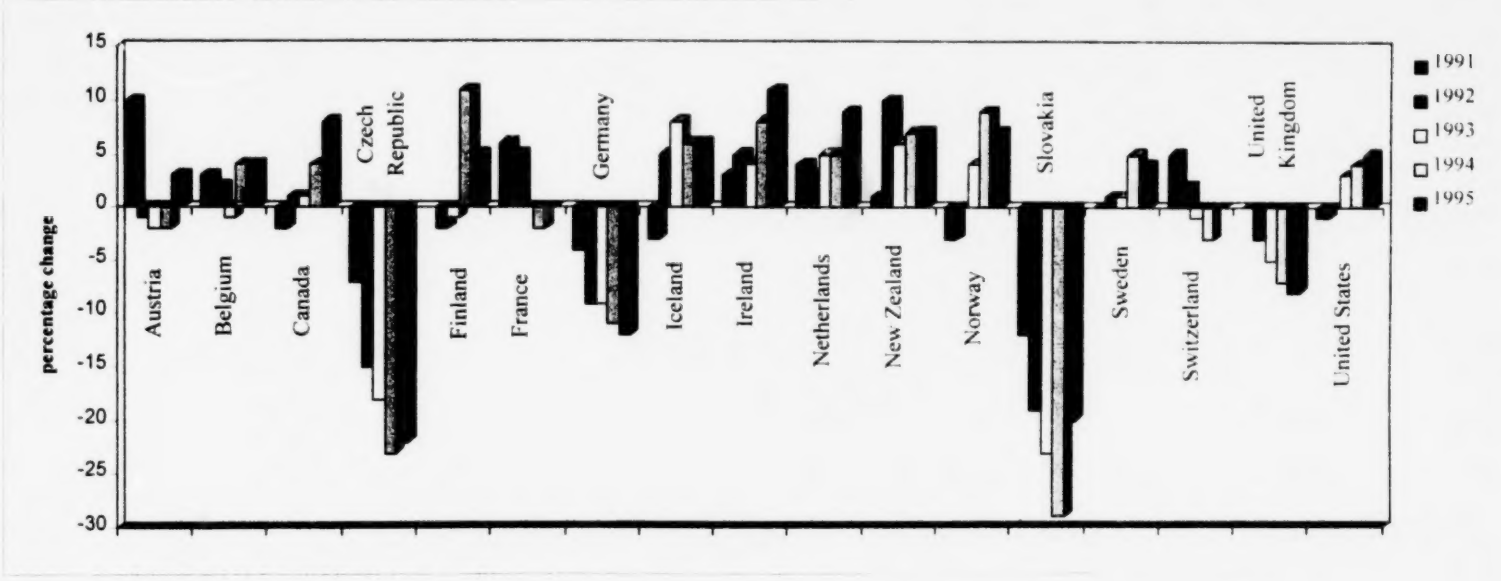

Figure B.2. Trend in CO_2 emissions from fuel combustion, 1990 to 1995 (percentage change, 1990 = 0)

Table B.3. CO_2 emissions from transport, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	13 970	111	111	108	112	114		15 880
Belgium	19 964	100	105	106	110	109		21 834
Canada	140 000	96	97	99	105	107		150 453
Czech Republic	7 959	86	102	104	104	112		8 912
Finland[a]	11 500		101	96	99	97		11 130
France	124 921	102	104	104	106	108		134 623
Germany	158 647	102	106	109	106	108		170 700
Iceland	721	101	101	102	103	104		749
Ireland	4 885	105	114	113	119	127		6 209
Monaco[b]								27
Netherlands	26 800	100	104	106	108	112		30 100
New Zealand	8 748	100	104	109	117	126		10 983
Norway	13 885	98	99	103	103	105		14 578
Slovak Republic	5 168	86	80	78	81	82		4 216
Sweden	18 650	100	103	99	101	104		19 341
Switzerland	14 668	104	100	100	101	99		14 580
United Kingdom	117 944	99	101	102	102	102		119 787
United States[c]								1 598 375

[a] Party did not provide estimate for 1991.
[b] As Party did not provide estimate for 1995, but for 1996, this estimate is given in the table. The trend in emissions is not given here since only an estimate for the last reported year was provided.
[c] Party only provided an estimate for 1995.

Comments

The trend in emissions from *transport* is much more homogeneous than from other sectors amongst Parties; there is a significant upward trend in emissions for the vast majority of Parties. Of the 16 Parties reporting CO_2 emissions from *transport* for 1990 to 1995, 13 reported increases over the period. The increases for these Parties ranged from 2 (United Kingdom) to 27 per cent (Ireland). For the three Parties reporting lower emissions, the decreases were 1 per cent (Switzerland), 3 per cent (Finland) and 18 per cent (Slovakia). The emissions from *transport* for the Parties as a whole grew by 6.6 per cent from 1990 to 1995.

For 10 of the 13 Parties with emissions greater in 1995 over that of 1990, there was a continual increase in emissions from year to year from 1991. In Finland and Switzerland emissions were lower in 1995 than 1990 but they actually fluctuated around the levels of 1990 rather than decreasing from year to year. The Czech Republic, Germany and the United Kingdom, which reported lower total CO_2 emissions in 1995, actually saw *transport* emissions increase by 12, 8 and 2 per cent, respectively. Slovakia, which reported the greatest decrease in emissions from 1990 to 1995, has had increasing emissions from *transport* since 1993.

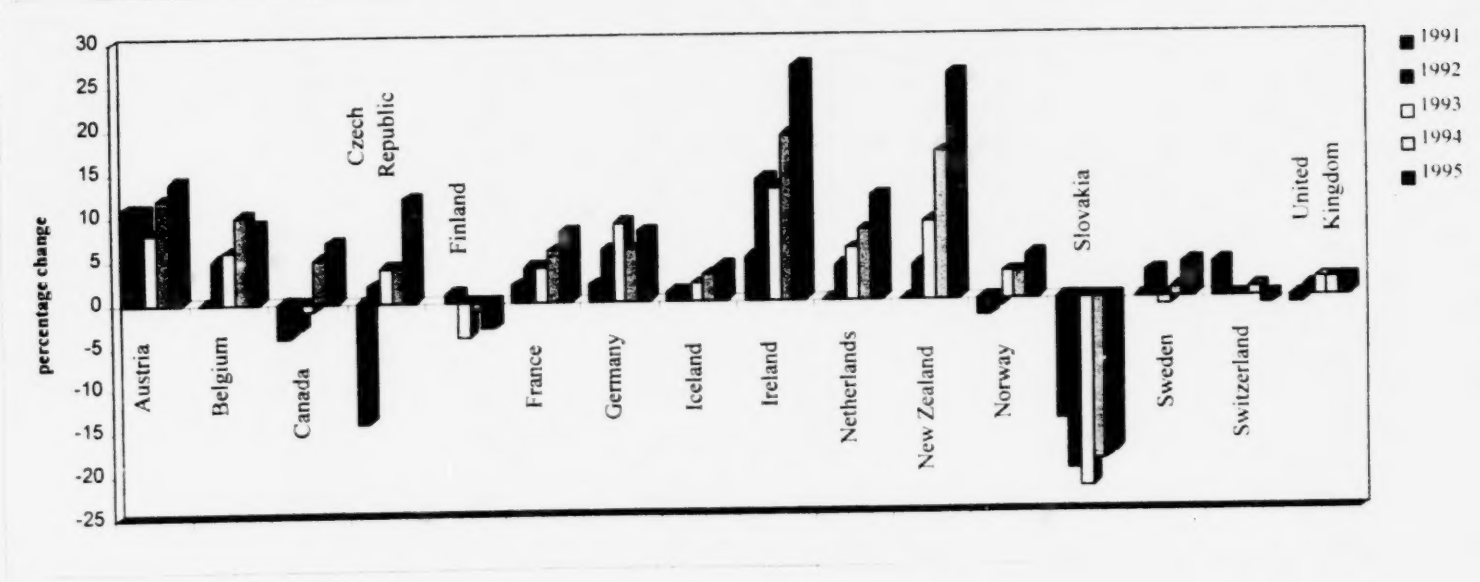

Figure B.3. Trend in CO_2 emissions from transport, 1990 to 1995 (percentage change, 1990 = 0)

Table B.4. CO_2 emissions from small combustion[a], 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	12 850	119	109	115	109	106		13 580
Belgium	26 262	115	114	113	112	117		30 832
Canada	69 830	97	101	107	106	107		74 425
Czech Republic	35 948	83	66	64	57	53		19 039
Finland[b]	7 900		110	100	105	110		8 710
France	99 860	110	110	106	101	102		101 756
Germany	198 190	101	93	98	92	94		186 100
Iceland	704	103	111	116	113	115		808
Ireland	7 859	120	118	114	120	118		9 265
Monaco[c]								51
Netherlands	37 300	114	106	112	105	109		40 700
New Zealand	2 766	95	108	98	105	100		2 775
Norway	2 506	85	76	74	79	75		1 891
Slovak Republic[d]	13 813					59		8 090
Sweden	10 672	96	96	94	96	93		9 903
Switzerland	18 322	105	104	101	95	100		18 290
United Kingdom	111 703	110	107	110	105	103		114 893
United States[e]								597 105

[a] Includes emissions from source/sink categories *commercial/institutional*, *residential* and *agriculture/forestry/fishing*.
[b] Party did not provide estimate for 1991.
[c] As Party did not provide estimate for 1995, but for 1996, this estimate is given in the table. The trend in emissions is not given here since only an estimate for the last reported year was provided.
[d] Party only provided an estimates for 1990 and 1995.
[e] Party only provided an estimate for 1995.

Comments

The trend in CO_2 emissions from *small combustion* varies amongst Parties, with 10 reporting emissions in 1995 greater than in 1990 and six reporting lower emissions. The range for those Parties which have increased emissions was from 2 to 18 per cent, while for those with lower emissions the range was from 47 to 6 per cent below that of 1990. Emissions in New Zealand and Switzerland in 1995 were approximately the same as in 1990. For all the Parties considered here as a whole, CO_2 emissions from *small combustion* decreased by 2.4 per cent.

The trend in emissions varied from Party to Party and from year to year for individual Parties. For those Parties with increasing emissions over the period, the growth fluctuated, with a general upward trend being prevalent only in some Parties. The fluctuation from year to year can be expected, owing to the nature of the sources of these emissions. The energy demand from the *commercial/institutional* and *residential* sectors depends on numerous factors, such as the demand for output and services, and weather conditions. For most of the Parties which reported lower emissions, there was a discernible downward trend from year to year.

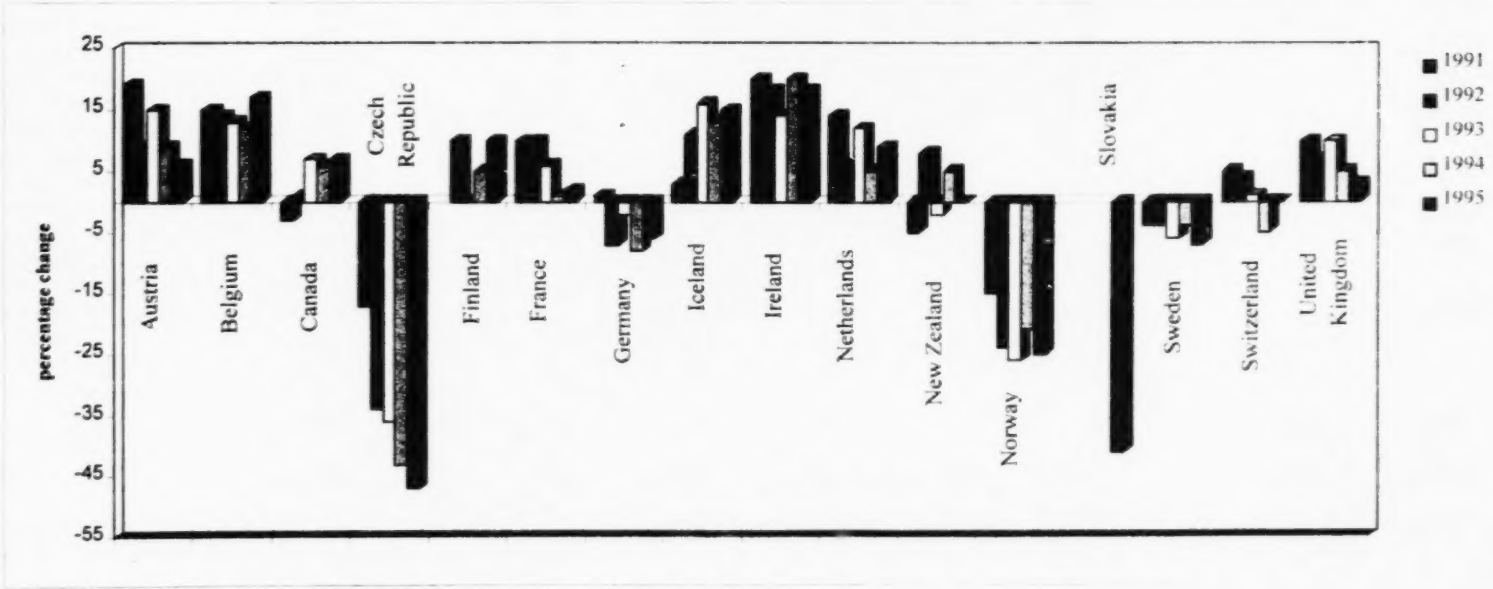

Figure B.4. Trend in CO_2 emissions from small combustion, 1990 to 1995 (percentage change, 1990 = 0)

Table B.5. CO_2 emissions from industrial processes, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	12 700	100	90	86	88	89		11 3[illegible]
Belgium	9 188	104	105	106	114		10 456	
Canada	21 800	101	101	110	115	114		24 834
Czech Republic	5 417	80	85	77	76	77		4 170
Finland	1 200		85	72	70	70		840
France	16 638	95	128	84	86	95		15 866
Germany	27 515	89	92	92	92	92		25 200
Iceland	391	91	92	105	105	109		425
Ireland	1 627	102	104	100	112	109		1 772
Monaco								
Netherlands	1 850	97	97	103	108	108		2 000
New Zealand	2 387	105	111	116	112	115		2 736
Norway	6 514	92	90	94	102	107		6 969
Slovak Republic	3 447	79	90	82	89	90		3 090
Sweden	3 787	98	108	106	111	118		4 458
Switzerland	3 363	90	81	76	81	78		2 620
United Kingdom	10 304	90	78	79	88	89		9 178
United States	62 390	94	100	106	112	112		70 084

[a] Party did not provide estimate for 1991.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] As Party provided estimates in carbon equivalent for 1990-1994 the secretariat converted estimates to equivalent CO_2 emissions. Estimates were reported as *industrial processes* and other (presumably *fugitive fuel emissions*).

Comments

CO_2 emissions from *industrial processes* increased from 1990 to 1995 for nine Parties and decreased for eight. For those Parties with increasing emissions, the increases were between 7 and 18 per cent over the 1990 level, while for those Parties with decreasing emissions, the declines ranged from 30 to 5 per cent. The aggregate emissions of all the Parties considered here were 2.9 per cent higher in 1995 than in 1990.

For those Parties with increasing emissions, an upward trend from year to year was generally prevalent. For Parties with lower emissions in 1995, there was no discernible downward trend from year to year; for some Parties there was rather a decline in emissions in the years immediately following 1990, followed by increases toward the end of the period.

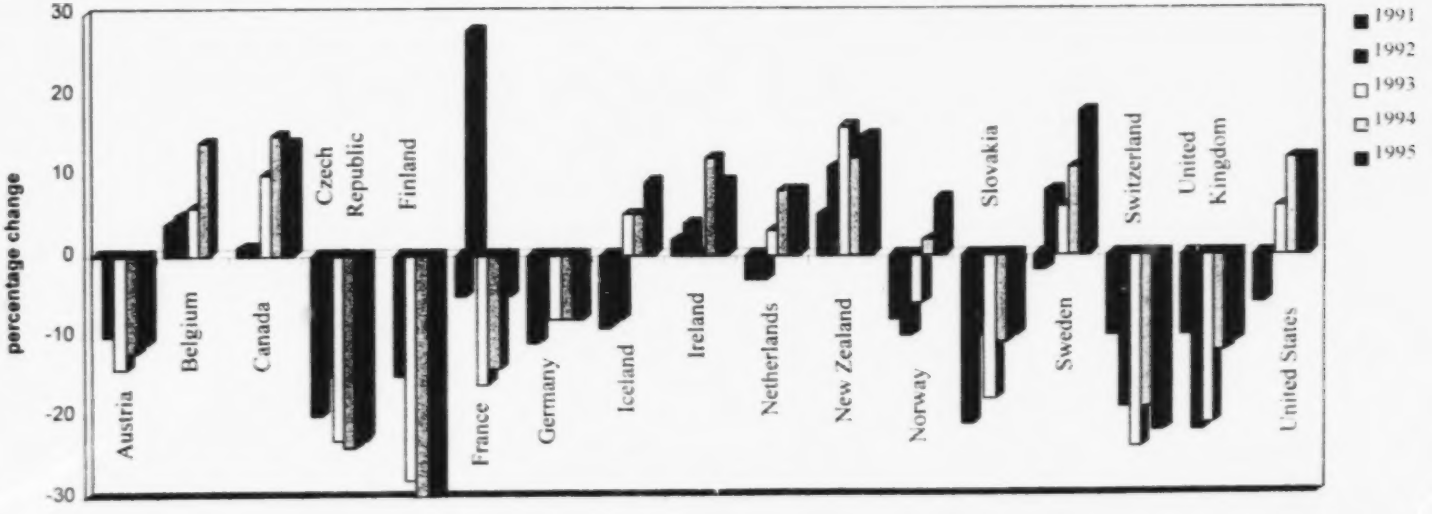

Figure B.5. Trend in CO_2 emissions from industrial processes, 1990 to 1995 (percentage change, 1990 = 0)

Table B.6. Total anthropogenic CH_4 emissions, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	587	98	98	98	99	99		580
Belgium	634	99	99	100	100		635	
Canada	3 200	100	103	109	113	117		3 732
Czech Republic	888	92	87	82	80	83		733
Finland[a]	246		100	99	100	98		241
France	3 017	100	97	97	95	94		2 844
Germany	5 682	92	91	88	85		4 849	
Iceland	14	99	98	98	99	97		14
Ireland	811	98	99	99	99	100		812
Monaco[b]								
Netherlands	1 104	102	98	97	97	96		1 063
New Zealand	1 706	98	95	93	95	96		1 635
Norway	432	100	101	104	108	109		469
Slovak Republic	409	93	88	81	77	77		316
Sweden	324	99	99	99	94	91		296
Switzerland	244	100	99	99	97	97		235
United Kingdom	4 464	99	98	91	86	86		3 817
United States[c]	29 710	101	102	101	104	104		30 975

[a] Party did not provide estimate for 1991.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CH_4 emissions

Comments

In contrast to the trend in CO_2 emissions, CH_4 emissions for the majority of Parties decreased in comparison to 1990. For 14 of the 17 Parties reporting CH_4 emissions, the level of emissions in 1995 was equal to or below that of 1990, with decreases of as much as 23 and 17 per cent in Slovakia and the Czech Republic. Only Canada, Norway and the United States recorded a significant increase in emissions over the period. Aggregate emissions in 1995 for all the Parties were 0.4 per cent lower than in 1990.

The increase in emissions for Canada and Norway was due partly to the substantial increase in *fugitive fuel emissions*, while in the case of the United States it was on account of growth in emissions from the *agriculture* and *waste* sectors. For a few Parties, emissions actually fluctuated around the levels of 1990 with no discernible pattern. For those Parties with decreasing emissions over the period, there was in most cases a falling trend from year to year; for many, this was due to decreases in the level of emissions from the *agriculture* and *waste* sectors.

Figure B.6. Trend in total CH_4 emissions, 1990 to 1995 (percentage change, 1990 = 0)

Table B.7. CH_4 fugitive fuel emissions, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last Reported Value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	4	106	104	109	112	122		5
Belgium	53	93	83	82	84		45	
Canada	1 400	100	107	114	121	128		1 791
Czech Republic	460	91	87	85	81	88		405
Finland[a]								
France	332	99	98	102	101	100		333
Germany	1 563	94	93	83	75		1 170	
Iceland[a]								
Ireland	10	95	100	105	105	109		11
Monaco[b]								
Netherlands	179	105	91	88	95	95		170
New Zealand	25	88	89	88	93	110		27
Norway	21	105	129	138	143	143		30
Slovakia	122	93	84	87	86	88		107
Sweden[a]								
Switzerland	15	99	97	94	91	87		13
United Kingdom	1 298	101	98	77	62	65		843
United States[c]	9 961	98	98	93	95	94		9 347

[a] Party did not provide estimates.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CH_4 emissions.

Comments

Of the 14 Parties reporting *fugitive fuel emissions*, five had higher emissions, in 1995 in comparison to 1990, eight lower emissions and one (France) essentially unchanged emissions. For the Parties with increased emissions (AUT, CAN, IRE, NOR, NZL), the range of increases was from 9 to 43 per cent. For those with lower emissions (BEL, CHE, CZE, DEU, GBR, NLD, SLO, USA), the decrease ranged was from 35 to 5 per cent. Emissions for all the Parties taken together decreased by 7.4 per cent.

For Parties with rising emission levels, this source was the fastest growing source of CH_4 emissions; for New Zealand, *fugitive fuel emissions* were the only source of the increase in CH_4 emissions. For four of these Parties the increase in emissions was due to fugitive emissions from *oil and natural gas* production. For New Zealand it was on account of *coal mining*. For those Parties which reported declining emissions, there was a discernible downward trend throughout the period, mostly reflecting decreasing fugitive emissions from *coal mining*.

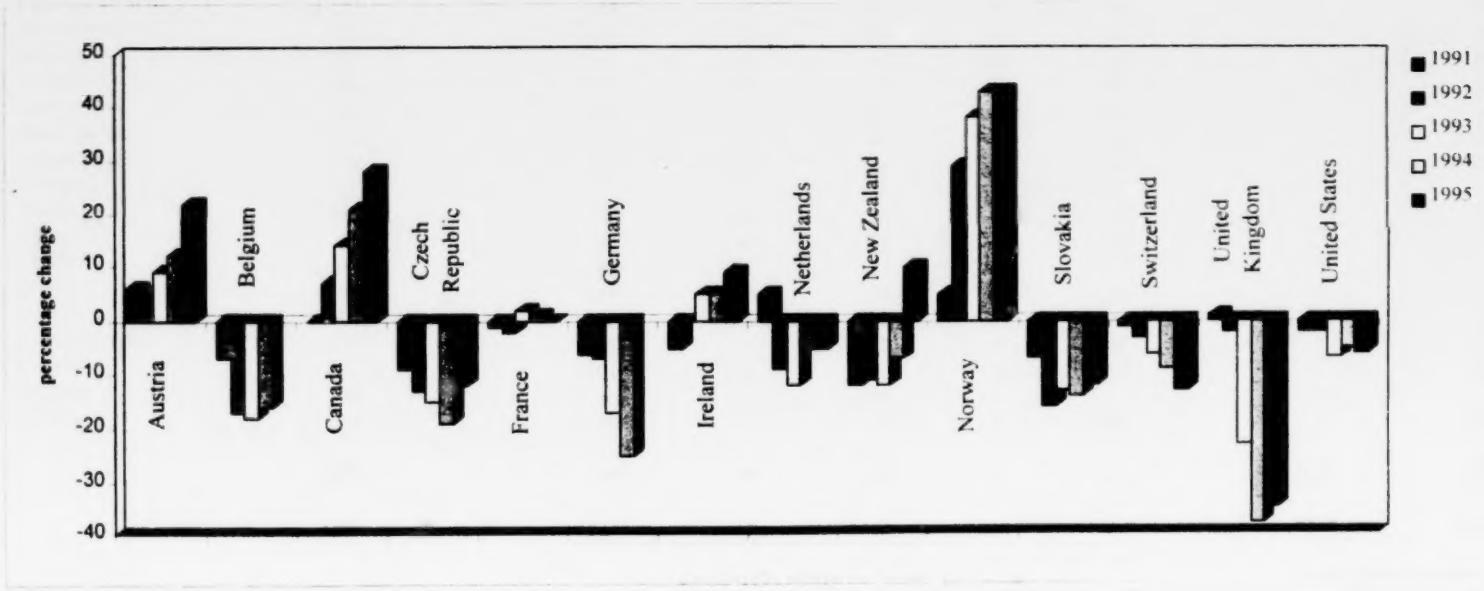

Figure B.7. Trend in CH_4 fugitive fuel emissions, 1990 to 1995 (percentage change, 1990 = 0)

Table B.8. CH_4 emissions from agriculture, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	208	96	97	98	101	100		209
Belgium	388	99	99	100	100		389	
Canada	890	101	100	104	108	112		996
Czech Republic	204	91	83	72	68	68		139
Finland	101	96	93	92	92	87		88
France	1 626	98	96	96	96	95		1 551
Germany	2 044	88	84	83	81		1 660	
Iceland	12	98	96	95	96	93		11
Ireland	640	98	98	99	99	99		637
Monaco[a]								
Netherlands	505	102	100	98	96	94		475
New Zealand	1 513	98	95	93	95	96		1 460
Norway	91	102	104	102	107	105		96
Slovakia	187	92	81	70	65	65		122
Sweden	200	98	99	99	101	99		197
Switzerland	151	101	100	100	98	98		148
United Kingdom	1 143	98	98	97	98	97		1 104
United States[b]	8 738	102	104	104	108	109		9 568

[a] Party did not provide estimates but indicated that emissions were negligible.
[b] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CH_4 emissions.

Comments

The majority of Parties (11) reported decreasing CH_4 emissions from *agriculture* for the period 1990 to 1995, with declines ranging from 32 to 1 per cent below 1990 levels. Three Parties reported increases, ranging from 5 to 12 per cent. Despite the decrease in emissions for most Parties, the weight of the contribution to total emissions of two of the Parties (CAN, USA) with increased emissions, meant that emissions for the Parties as a whole were 1.1 per cent higher in 1995 than in 1990.

For the majority of Parties with a falling emission level, the decrease was due to the declining number of livestock. For the three Parties with increasing emissions, the increase in the number of livestock was the major cause, except for the United States which in addition to increasing emissions from livestock also reported increasing emissions from *rice cultivation*.

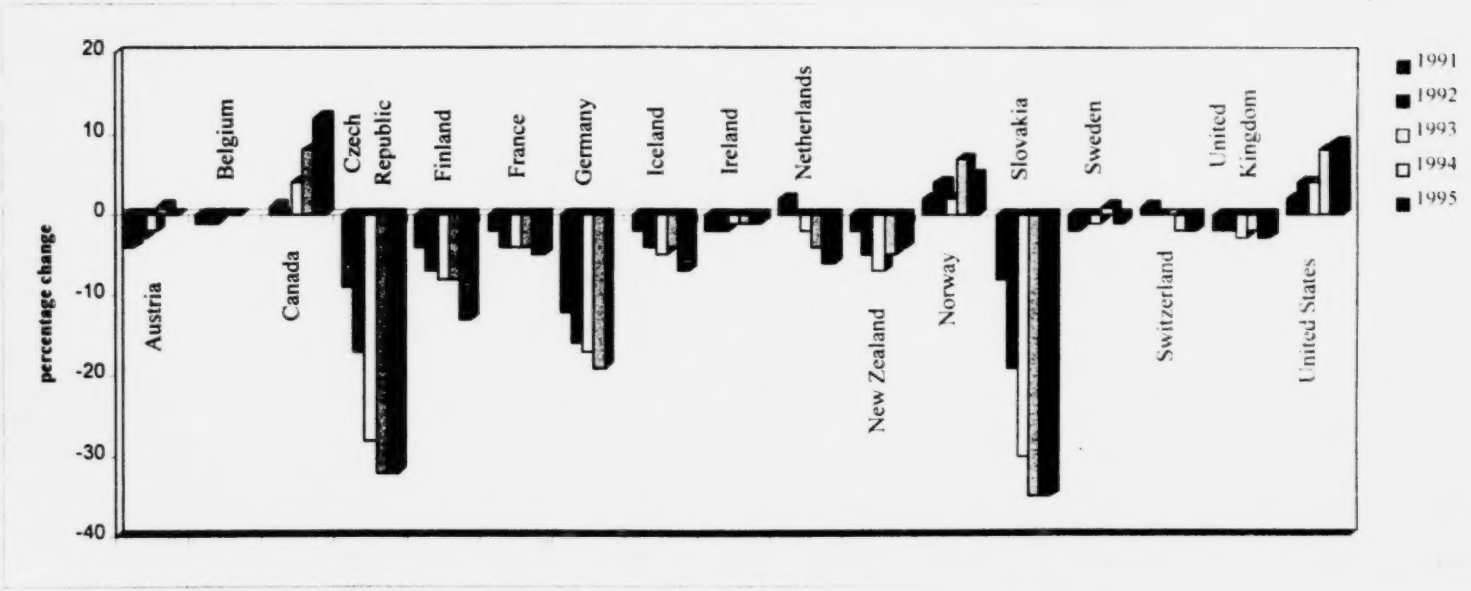

Figure B.8. Trend in CH_4 emissions from agriculture, 1990 to 1995 (percentage change, 1990 = 0)

Table B.9. CH_4 emissions from waste, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	227	99	99	98	97	97		220
Belgium	174	102	104	105	106		184	
Canada	840	99	100	102	104	106		889
Czech Republic	149	100	99	97	97	97		144
Finland	126	102	105	106	105	106		133
France	800	99	97	95	83	85		678
Germany	1 870	97	101	101	102		1 900	
Iceland	2	100	105	111	116	121		2
Ireland	136	100	100	100	100	101		138
Monaco[a]								
Netherlands	379	100	99	99	100	100		380
New Zealand	155	101	98	96	91	85		132
Norway	302	100	100	102	106	107		322
Slovakia	65	106	118	108	100	97		63
Sweden	85	100	100	100	72	72		61
Switzerland	69	99	99	98	98	97		67
United Kingdom	1 925	98	98	96	95	93		1 786
United States[b]	9 787	104	104	107	111	113		11 100

[a] Party did not provide estimates but indicated that emissions were negligible.
[b] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent CH_4 emissions. Estimates include only emissions from landfills.

Comments

Eight Parties reported emissions ranging from 1 to 13 per cent higher in 1995 than in 1990, and eight Parties reported emissions, 28 to 3 per cent lower. For the Parties taken together, emissions from *waste* increased by 6.5 per cent from 1990 to 1995.

For the Parties that reported declining emissions, the fall was due mostly to decreasing emissions from landfills, except for the Czech Republic which reported substantial decreases in emissions from wastewater treatment. For those Parties with increasing emissions, the main sources of the increase varied. For about half the main source was landfills, and for the rest it was wastewater treatment and waste incineration.

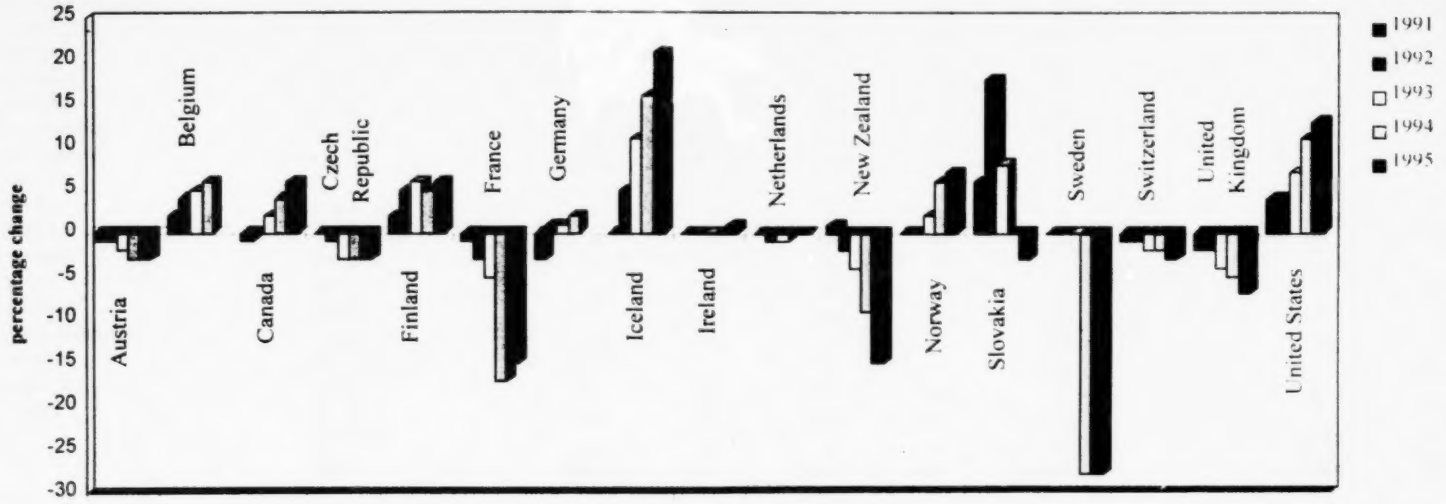

Figure B.9. Trend in CH_4 emissions from waste from 1990 to 1995 (percentage change, 1990 = 0)

Table B.10. Total anthropogenic N_2O emissions, 1990 - 1995 (Gigagrams and percentage)

	Percentage relative to 1990, 1990=100						Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	11.6	104	105	106	109	110		12.8
Belgium	30.8	100	97	99	105		32.3	
Canada	86.0	101	107	109	116	125		107.8
Czech Republic	25.8	91	87	82	83	84		21.6
Finland[a]	18.0		94	100	100	100		18.0
France	181.7	99	96	90	93	95		173.5
Germany	226.0	97	100	96	97		219.0	
Iceland	0.4	95	90	88	88	95		0.4
Ireland	29.4	86	87	87	88	89		26.0
Monaco[b]								
Netherlands	51.2	104	111	112	113	114		58.5
New Zealand	47.5	96	97	97	97	98		46.7
Norway	15.0	100	87	93	93	93		14.0
Slovakia	12.5	87	72	57	58	62		7.8
Sweden	9.2	100	96	100	103	100		9.2
Switzerland	11.5	101	102	103	103	103		11.8
United Kingdom	120.0	95	81	73	83	79		95.0
United States[c]	426.2	103	103	106	108	110		467.0

[a] Party did not provide estimates for 1991.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent N_2O emissions.

Comments

The trend in N2O emissions varied to some degree amongst Parties, although for the majority of the 17 Parties reporting, there was a decrease in emissions over the 1990-1995 period. Only six Parties reported emissions higher in 1995 than in 1990, the increases varying from 3 to 25 per cent. Nine Parties reported emissions, ranging from 38 to 2 per cent lower, and for two Parties the level was approximately the same as in 1990. Although for most Parties the trend was downward, for the Parties as whole emissions increased by 1.4 per cent on account of the size of the contribution to total emissions of some Parties.

The Parties with a rising emission level in 1995, seem to have had generally increasing emissions throughout the period. For those Parties with a falling level, there was a general downward trend, or for a few Parties a stabilization in emissions at levels lower than in 1990. For the six Parties with increased emissions, *fuel combustion* was the major source of the increase while for Canada, the Netherlands and the United States *agriculture* also contributed substantially to the increase. Decreasing emissions from *industrial processes* and *agriculture*, thanks to improved production processes and lower levels of nitric acid production (for fertilizer manufacture), were the major reasons for the drop in N_2O emissions for Parties with decreasing emissions.

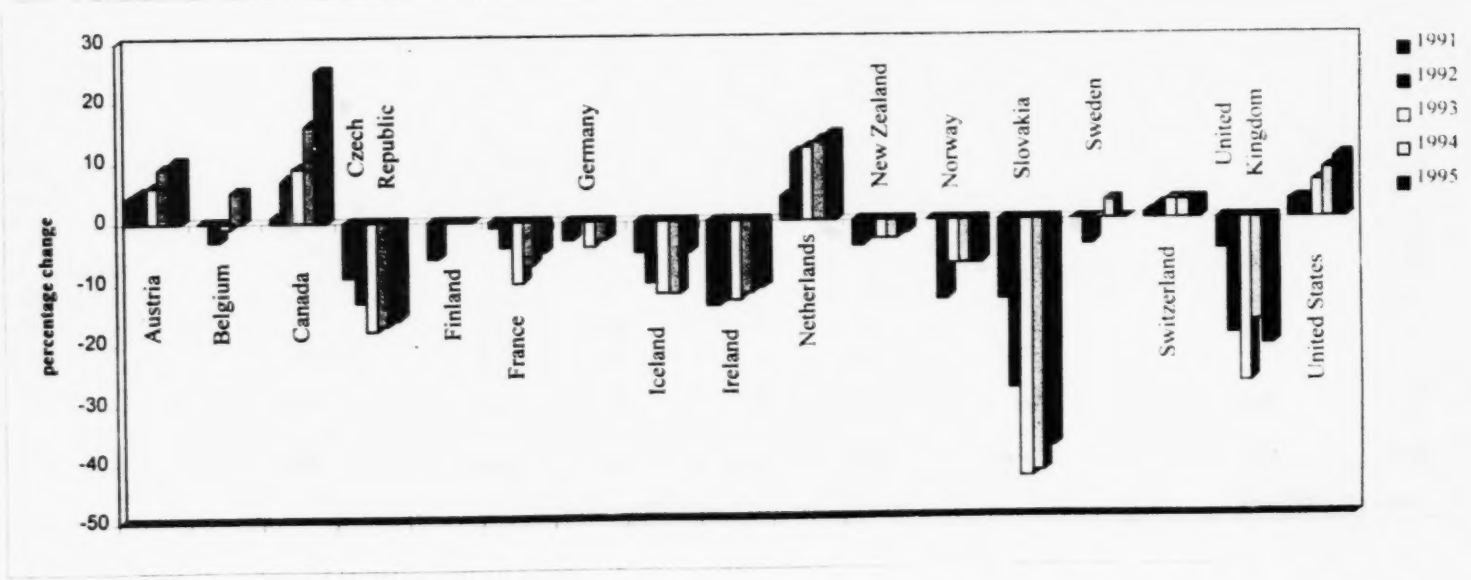

Figure B.10. Trend in N_2O emissions, 1990 to 1995 (percentage change, 1990 = 0)

Table B.11. N_2O emissions from fuel combustion, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	4.3	112	115	117	124	128		5.5
Belgium	7.7	105	106	106	109		8.4	
Canada	36.0	106	117	128	142	154		55.4
Czech Republic	20.0	93	86	83	83	82		16.4
Finland[a]	5.0		120	120	120	120		6.0
France	14.3	107	108	106	111	118		16.9
Germany	37.0	105	108	111	114		42.0	
Iceland	0.0	100	100	100	100	175		0.1
Ireland	2.8	121	124	119	127	127		3.5
Monaco[b]								
Netherlands	5.5	115	127	136	144	153		8.4
New Zealand	2.6	105	112	106	101	95		2.5
Norway	2.0	100	100	100	150	100		2.0
Slovakia	0.6	100	133	117	117	133		0.8
Sweden	6.3	100	100	106	111	108		6.8
Switzerland	1.4	109	118	127	135	146		2.0
United Kingdom	14.7	102	105	118	131	141		20.8
United States[c]	130.2	100	109	109	109	111		145.0

[a] Party did not provide estimates for 1991.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent N_2O emissions.

Comments

Most of the Parties (14) reported increased N2O emissions from *fuel combustion* over the period 1990 to 1995. For these Parties, emissions in 1995 were 8 to 75 per cent higher than in 1990. The Czech Republic and New Zealand reported emissions, 18 and 5 per cent lower, respectively, than in 1990. The emissions for the group of Parties as a whole were 17.9 per cent higher in 1995 than in 1990.

There was an increasing trend in emissions from *fuel combustion* for most of the Parties from year to year. For the majority of Parties with increased emissions from *fuel combustion*, the major source was *transport*. For the two Parties with declining emissions, the decrease stemmed from the *energy and transformation*, *commercial/institutional* and *residential* sectors.

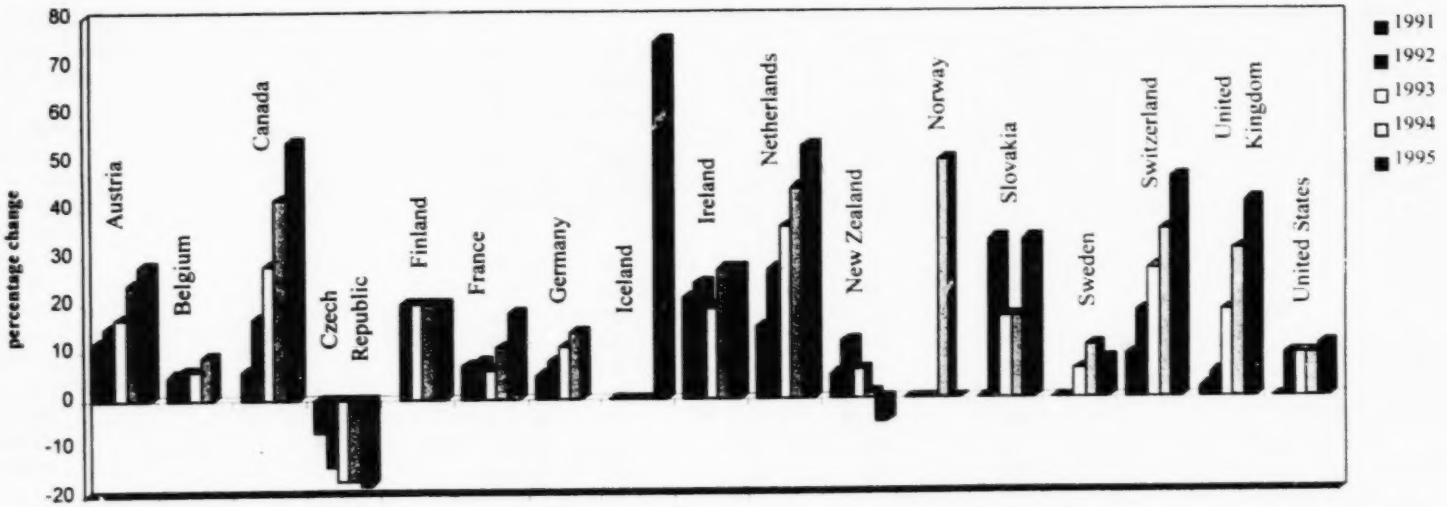

Figure B.11. Trend in N_2O emissions from fuel combustion, 1990 to 1995 (percentage change, 1990 = 0)

Table B.12. N_2O emissions from transport, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	3.1	115	123	125	134	138		4.3
Belgium	0.9	97	108	118	129		1.2	
Canada	29.0	107	121	138	155	166		48.0
Czech Republic	0.8	87	100	100	113	125		1.0
Finland[a]	2.0		100	100	100	100		2.0
France	4.0	106	112	123	146	167		6.7
Germany	11.0	127	145	164	173		19.0	
Iceland	~0.0	100	100	100	100	200		~0.0
Ireland	0.2	244	250	244	256	272		0.5
Monaco[b]								
Netherlands	4.9	110	124	135	147	157		7.7
New Zealand	0.4	101	106	110	117	126		0.5
Norway	1.0	100	100	100	100	100		1.0
Slovakia								0.3
Sweden	2.6	100	100	100	108	112		2.9
Switzerland	1.1	111	122	134	145	157		1.8
United Kingdom	3.4	106	121	159	203	244		8.3
United States[c]								109.0

[a] Party did not provide estimates for 1991.
[b] Party did not provide estimates but indicated that emissions were negligible.
[c] Party only reported estimates for 1995.

Comments

There was an increasing trend in N_2O emissions from *transport* for almost all Parties. Of the 15 Parties reporting emissions from *transport*, 13 reported increases since 1990, ranging from 12 to 172 per cent higher than 1990. For all the Parties taken together emissions have grown 62.9 per cent between 1990 and 1995.

Although emissions from *transport* are not the largest source of total N_2O emissions, accounting for less than 15 per cent for the majority of Parties, there is a discernible increase in emissions for almost all Parties. The increase in emissions, reflects not only the general growth in the *transport* sector but also the expanding number of vehicles with catalytic converters, which reduce nitrogen oxide (NO_x) emissions but actually increase N_2O emissions.

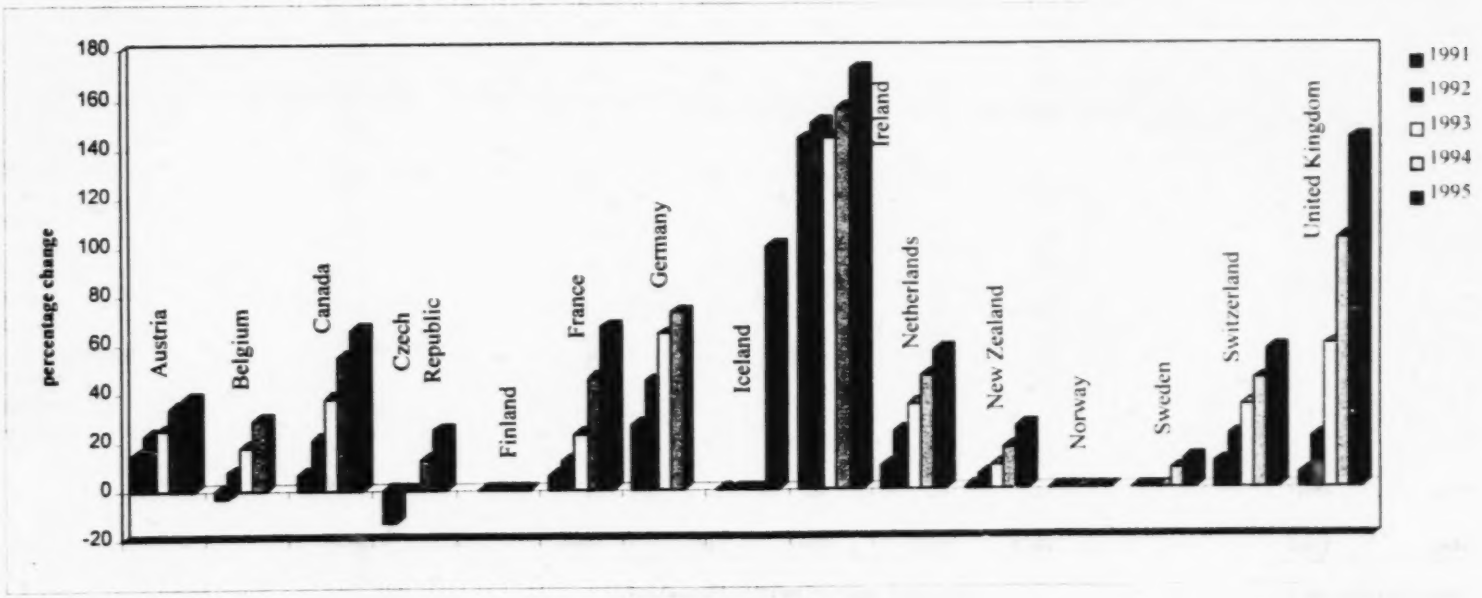

Figure B.12. Trend in N_2O emissions from transport, 1990 to 1995 (percentage change, 1990 = 0)

Table B.13. N_2O emissions from industrial processes, 1990 - 1995 (Gigagrams and percentage)

		Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	0.6	100	92	97	95	92		0.6
Belgium	11.5	97	88	95	107		12.3	
Canada	37.0	95	95	86	103	100		37.1
Czech Republic	3.3	85	106	82	91	103		3.4
Finland	3.0	100	67	100	100	100		3.0
France	90.0	97	92	83	86	89		80.4
Germany	83.0	101	112	104	98		81.0	
Iceland	0.2	94	88	88	88	88		0.1
Ireland	2.6	100	100	100	100	100		2.6
Monaco[a]								
Netherlands	18.6	105	103	102	97	97		18.1
New Zealand[b]								0.0
Norway	7.0	86	57	71	71	71		5.0
Slovakia	2.1	71	67	52	38	52		1.1
Sweden	2.7	100	85	85	85	84		2.3
Switzerland	0.3	100	100	97	97	97		0.3
United Kingdom	94.0	94	75	64	75	68		63.7
United States[c]	94.7	100	100	100	112	111		105.0

[a] Party did not provide estimates but indicated that emissions were negligible.
[b] Party did not provide estimates.
[c] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent N_2O emissions.

Comments

N_2O emissions from *industrial processes* were lower in 1995 than in 1990 for the majority of Parties (10), with only three Parties (BEL, CZE, USA) reporting increased emissions, and three Parties (CAN, FIN, IRE) emissions the same as in 1990. For those Parties with lower emissions, the decrease ranged from 48 to 2 per cent below 1990 levels. For those with increased emissions the proportion was from 3 to 11 per cent over 1990 levels. Emissions for the Parties as a whole have decreased by 7.7 per cent.

As the decrease in emissions for several Parties was due to improved production processes, there was a stabilization, or slight yearly fluctuation, in emissions at levels lower than in 1990. For two of the Parties (BEL, CZE) with higher emissions in 1995, emissions from 1990 to 1995 did not increase on a continuous basis but rather fluctuated around the levels of 1990.

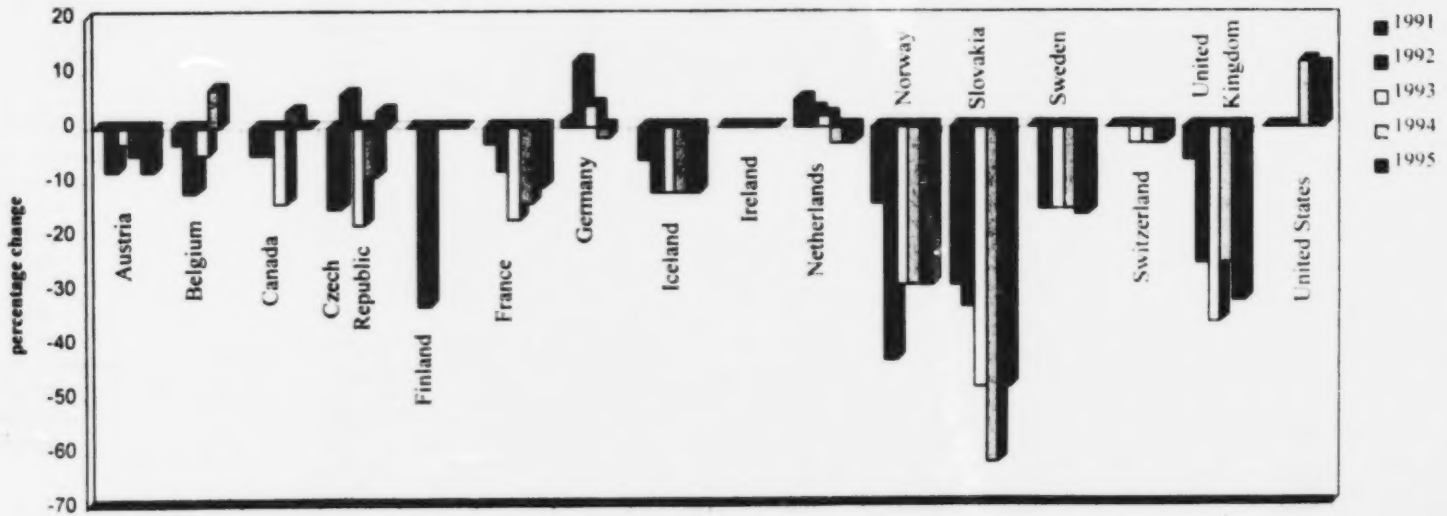

Figure B.13. Trend in N_2O emissions from industrial processes, 1990 to 1995 (percentage change, 1990 = 0)

Table B.14. N_2O emissions from agriculture, 1990 - 1995 (Gigagrams and percentage)

	Percentage relative to 1990, 1990=100					Last reported value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	3.3	100	100	101	101	101		3.3
Belgium	10.9	100	100	98	99		10.8	
Canada	11.0	100	109	118	118	121		13.3
Czech Republic	2.3	87	74	78	78	74		1.7
Finland	10.0	100	90	90	90	90		9.0
France	54.5	99	97	93	95	97		52.6
Germany	96.0	91	86	84	90		86.0	
Iceland	0.2	95	91	86	86	86		0.2
Ireland	23.3	80	80	81	82	82		19.1
Monaco[a]								
Netherlands	22.2	103	118	118	120	121		26.9
New Zealand	44.9	96	96	96	97	98		44.1
Norway	6.0	100	100	100	100	100		6.0
Slovakia	9.5	89	68	53	57	57		5.4
Sweden	0.2	100	100	100	100	100		0.2
Switzerland	9.2	100	99	98	97	96		8.8
United Kingdom	10.4	101	97	94	96	93		9.7
United States[b]	201.3	100	100	106	106	108		217.1

[a] Party did not provide estimates but indicated that emissions were negligible.

[b] As Party provided estimates in carbon equivalent for 1990-1994, the secretariat converted estimates to equivalent N_2O emissions.

Comments

For the majority of Parties (11), N_2O emissions from *agriculture* (fertilizer use) were lower in 1995 than in 1990,the decreases ranging from 43 to 1 per cent. Only four Parties (AUT, CAN, NLD, USA) reported increases, ranging from 1 to 21 per cent. Emissions from all the Parties taken together in 1995 were 0.2 per cent lower than in 1990.

There was a discernible decrease in emissions for most of the Parties, as production of nitric acid and application of nitrogenous fertilizer declined. For the four Parties reporting a rising emission trend, the increase was due to the expansion in agricultural production, and subsequent fertilizer application, and for the United States in intensified fertilizer application designed to compensate for nutrients lost in floods in 1993.

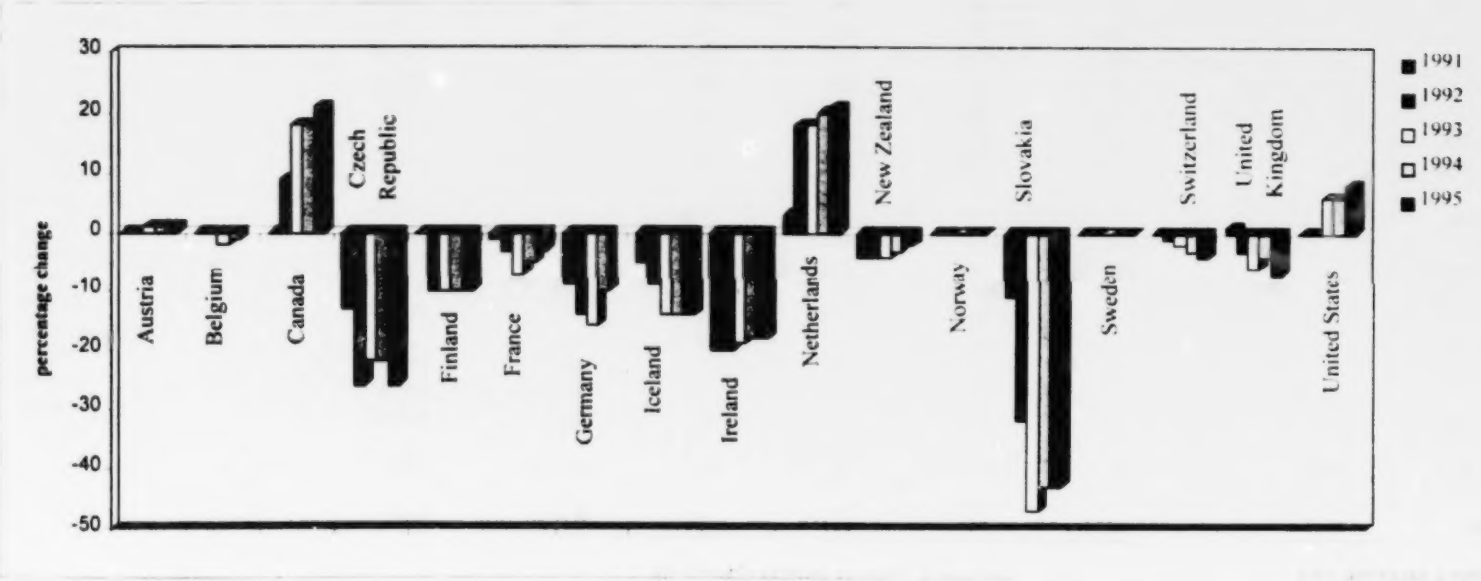

Figure B.14. Trend in N_2O emissions from agriculture, 1990 to 1995 (percentage change, 1990 = 0)

Table B.15. Total anthropogenic emissions of all greenhouse gases[a], excluding land-use change and forestry, 1990 - 1995 (Gigagrams of CO_2 equivalent and percentage)

		Percentage relative to 1990, 1990=100					Last Reported Value	
	1990	1991	1992	1993	1994	1995	1994	1995
	(Gg)	%	%	%	%	%	(Gg)	(Gg)
Austria	77 814	106	98	97	98	100		78 173
Belgium	138 943	102	102	100	105		145 522	
Canada	566 664	98	101	103	105	109		619 726
Czech Republic	192 130	92	85	82	78	79		150 913
Finland	64 546		97	99	108	103		66 691
France[b]	498 067	104	104	98	97	100		498 855
Germany	1 210 387	96	92	91	90	88		1 070 691
Iceland	2 883	95	94	96	95	96		2 765
Ireland	56 861	99	100	100	103	104		59 060
Monaco[c]								
Netherlands	215 357	99	99	104	105	110		236 154
New Zealand	77 188	99	100	99	104	105		80 913
Norway	54 011	96	93	96	101	101		54 328
Slovakia	72 995	89	82	77	72	79		57 891
Sweden	66 457	97	101	100	105	104		69 004
Switzerland	53 749	103	101	98	97	100		53 806
United Kingdom	718 764	100	97	94	93	91		656 872
United States	5 809 622	99	101	103	105	106		6 146 624

[a] Aggregated emissions of CO_2, CH_4, N_2O, and where reported HFCs, PFCs, SF_6 (see table B.15), using IPCC 1995 global warming potentials.
[b] As Party only reported emissions of HFCs, PFCs and SF_6 for 1990 and not subsequent years, these emissions have not been included in this table for comparison and consistency purposes.
[c] Party only reported emissions of CO_2.

Comments

For most of the Parties (9), total emissions of all greenhouse gases have increased since 1990. The increase in emissions from 1990 to 1995 ranged from 1 to 10 per cent. For the Parties with a declining emissions trend, the decrease was from 21 to 4 per cent. Emissions for all the Parties taken together increased by 1.7 per cent over the period.

CO_2 was the foremost component of total greenhouse gas emissions for all Parties, with the exception of New Zealand where CH_4 had the largest share. For all the Parties with increased total emissions, the growth was due mostly to increases in CO_2 emissions, and for a few Parties, also partially to significant increases in HFC and SF_6 emissions. For the five Parties with a falling emission level, the decrease in the different gases was not homogeneous amongst Parties. For four of the five (CZE, DEU, GBR, SLO), the decrease in CO_2 emissions was the major reason for lower levels of total greenhouse gases. However, reductions in emissions of CH_4 and N_2O, and for some Parties PFCs, also contributed significantly to the overall reduction in greenhouse gases.

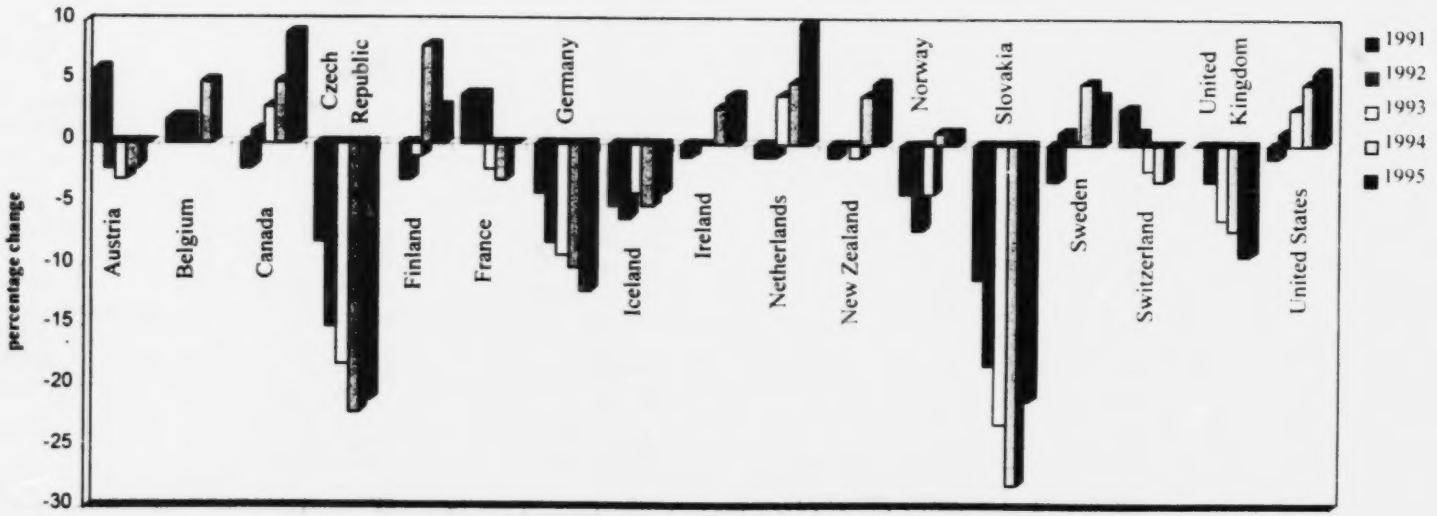

Figure B.15. Trend in total greenhouse gas emissions, 1990 to 1995 (percentage change, 1990 = 0)

Table B.16. Total anthropogenic emissions of all greenhouse gases[a], including land-use change and forestry[b], 1990 & 1995 (Gigagrams of CO_2 equivalent and percentage)

	1990	1995	Percentage relative to 1990, 1990=100
	(Gg)	(Gg)	%
Austria	64 514	64 593	100
Belgium[c]	136 886	143 465	105
Canada[d]			
Czech Republic	189 849	145 459	77
Finland[e]	34 546 - 45 546	52 691 - 59 691	116 - 173
France	469 963	452 054	96
Germany	1 180 387	1 040 691	88
Iceland[d]			
Ireland	51 701	52 830	102
Monaco[c,f]			
Netherlands	213 857	234 454	110
New Zealand	56 619	67 426	119
Norway	43 811	41 241	94
Slovakia	68 738	52 775	77
Sweden[g]	32 089	37 048	115
Switzerland	49 389	48 706	99
United Kingdom	737 540	666 817	90
United States	5 350 872	5 718 624	107

[a] Aggregated emissions of CO_2, CH_4, N_2O and, where reported, HFCs, PFCs, and SF_6 (see table A.4.1), using IPCC 1995 global warming potentials.
[b] For details on the estimates of *land-use change and forestry* included in the totals in this table, refer to table A.5.
[c] As estimates for 1995 were not available, estimates for the last reported year, 1994, are given in this table.
[d] Party did not provide estimates foe the *land-use change and forestry* sector.
[e] A range of estimates of emissions from cultivated peatlands and non-viable drainage areas was included in estimates for the *land-use change and forestry* sector, so a range for the total anthropogenic emissions of all greenhouse gases is given in this table.
[f] Party only reported emissions of CO_2.
[g] As estimates for 1995 were not available, estimates for the last reported year, 1992, are given in this table.

Comments

For the 15 Parties which reported estimates of emissions and removals from *land-use change and forestry*, inclusion of these estimates in the national total of all greenhouse gas emissions results in an increase in overall emissions from 1990 to 1995 for seven Parties and a decrease for seven Parties. There is a large degree of uncertainty in estimates for this sector, and varying degrees of coverage by Parties, so the range of increases and decreases, from 73 per cent above to 23 per cent below 1990 levels, in only indicative.

The trend in overall greenhouse gas emissions when *land-use change and forestry* estimates are included varies amongst Parties, and for some Parties differs significantly from the trend when that sector is excluded (table B.15). The levels of emissions or removals in that sector reported in 1990 and 1995, and the percentage change in these estimates from 1990 to 1995, vary substantially amongst Parties (table A.5).

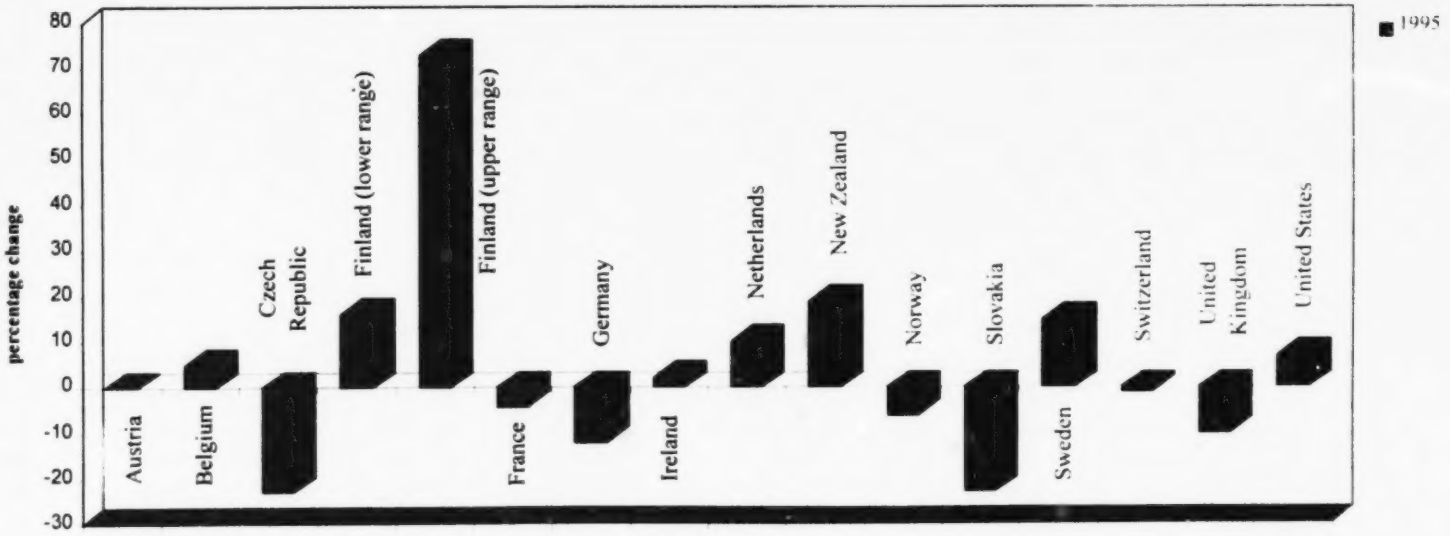

Figure B.16. Trend in total greenhouse gas emissions, including land-use change and forestry, 1990 to 1995 (percentage change, 1990 = 0)

Table C.1. Projected anthropogenic emissions of CO_2, excluding land-use change and forestry until 2020 (Gigagrams)

	Base level (1990)		Last reported inventory[b]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory	Projection[a]		2000		2005		2010		2020	
	(Gg)	(Gg)	(Gg)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria	61 880	61 880	62 020	57 300	-7	57 500	-7	58 300	-9		
Belgium[c]	116 090	115 800	121 297	125 200	8	133 300	15				
Canada	464 000	463 700	499 526	500 600	8	522 900	13	549 900	19	628 300	36
Czech Rep.	165 490	167 000	128 817	139 000	-17	153 000	-8	166 000	-1		
Finland	53 800	53 800	56 050	(58 000 - 60 000)	(8 - 12)			(56 000 - 71 000)	(4 - 31)	(49 000 - 80 000)	(-9)-(46)
France[d]	378 379		385 347								
Germany	1 014 155	1 014 000	894 500	894 000	-12	867 000	-15	854 000	-16	847 000	-17
Iceland	2 147	2 147	2 282	2 697	26	2 796	30	2 893	35	2 944	37
Ireland	30 719	30 719	33 931	34 998	14	38 228	24	40 775	33		
Netherlands	167 550	[173 000]	183 400	173 500	0	181 000	5	188 000	9	202 000	17
New Zealand	25 476	25 476	27 367	31 080	22	33 570	32	36 310	43	43 560	71
Norway	35 544	36 000	37 880	44 000	22	47 000	31	48 000	33	46 000	28
Slovakia	60 032	59 752	48 516	(44 780 - 46 178)	(-25)-(-23)	(49 142 - 51 919)	(-18)-(-13)	(53 220 - 56 519)	(-11)-(-4)		
Sweden[e]	55 445	[58 500]	58 108	60 100	3	62 100	6	64 300	10	~80 000	~37
Switzerland	45 070	[47 100]	44 170	43 900	-7	44 700	-5	45 700	-3		
UK	583 747	580 000	543 338	550 000	-5	593 000	2	595 000	3	682 000	18
USA	4 965 510	4 960 000	5 214 710	5 627 310	11	5 865 600	18	6 118 554	23	6 496 512	31

[a] Differences between the inventory base level and the projections base level are, for example, due to revisions of inventories, rounding, calibration of models, or the projection of only a subset of the sources. For some Parties (the Netherlands, Sweden and Switzerland) differences are also due to temperature adjustments. Base year values for projections that have been subject to temperature adjustments are put in brackets.

[b] All Parties reported their last inventory for 1995, with the exception of Belgium whose last inventory was reported for 1994. Belgium reported 1995 data only for CO_2 energy sector emissions.

[c] Belgium also provided a projection base level adjusted for temperature which had a value of 121,100 Gg.

[d] The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[e] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

All Parties except France provided projections for CO_2 emissions from the energy sector (excluding *land-use change and forestry*). Belgium projected these emissions until 2005, and for the *energy* sector until the year 2020. Four Parties presented projections until the year 2010, although Sweden presented a tentative figure for the year 2000. The other 10 reporting Parties presented projections up to the year 2020. Several Parties noted that the uncertainties associated with the long-term projections are even greater.

Of the Parties which presented projections, nine (BEL, CAN, FIN, ICE, IRE, NOR, NZL, SWE and USA), accounted for 73 per cent of 1990 CO_2 emissions. The projected growth in emissions is above 10 per cent for seven Parties. If unadjusted figures are compared, the Netherlands would show an increase. Seven Parties projected a stabilization or decrease for 2000 in comparison to the base year level and among them two are countries with economies in transition (EIT). The projected decrease in emissions is higher than 10 per cent for these two countries and for Germany. In general, the comparison of 1995 with the 1990 inventory ratified those trends: only five Parties showed a decrease of their CO_2 emissions in that period.

The long-term projections up to the year 2020 presented by ten Parties indicated that almost all of them expect a growth in their CO_2 emissions. Parties with increases accounted for 86 per cent of the 1990 inventory of these 10 countries. Only Finland (in one of the scenarios presented) and Germany projected a decrease of their emissions. Except for these two countries, the emissions projected for the year 2020 are higher than those of the year 2000. Four Parties which projected these emissions up to the year 2010 anticipated a decrease in relation to the base year. However, this decrease was less than that presented for the year 2000 for all but one Party. Belgium, which presented a projection to the year 2005, also foresaw an increasein its emissions in relation to the projection for the year 2000.

Notes*

Belgium: The projection given in table C.1 is based on the "with measures" scenario. It includes a CO_2/energy tax, which is envisaged. One other scenario was supplied: "with envisaged measures", which incorporates supplementary measures. In addition, Belgium submitted projections from a temperature-adjusted base year.

Czech Republic: The "with measures" scenario represented here for the Czech Republic was called "base scenario" in the second national communication. No baseline projection was supplied. For 1995, CO_2 emissions of 129,000 Gg were projected. The CO_2 emissions for 1990 and 1995, as reported in the inventories, differ from those of the projection, because different calculation methodologies were used. These differences, however, do not exceed expected limits of confidence.

Finland: The range of emissions as given in the table reflects two scenarios, one being the energy market scenario (EMS) without national or international measures to curb CO_2 emissions, and the other, the "energy policy scenario" (EPO), which assumes strengthening current control measures. Two different variants of strengthening the control measures are examined within the EPO scenario, one in which the use of wood and gas is increased, and one in which more nuclear power capacity is built.

Germany: The scenario presented in table C.1 is the "with-measures scenario"/"IWG-measures scenario" where CO_2 reduction measures are taken into account to the greatest possible extent. In addition, a "without-measures scenario"/"reference scenario" was presented where efficiency improvements are the main factor to counter increases in CO_2 emissions. The latter leads to a reduction of CO_2 emissions by 3 per cent instead of 12 per cent under the scenario reported in the table.

Netherlands: The emissions projections presented here are based on the trend scenario, which according to the second national communication "can be considered as an existing policy scenario" (p. 75). In addition, a "favourable CO_2 scenario" and a "without measures" scenario were presented. As the ECN scenarios used in the second national communication only provide figures for 2020, estimates for the years 2005 and 2010 are based on linear interpolation between 2000 and 2020. The Dutch projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

New Zealand: The "with measures" scenario presented in the table is estimated to reduce the growth in energy-related CO_2 emissions by about 21.5 per cent below the "business-as-usual" scenario.

Norway: The emission projections presented in the table are based on a variant of the "reference alternative" scenario based on current policies. In addition, a "baseline reference scenario" was developed, which assumes stabilization of global CO_2 emissions at 1990 levels by means of a global CO_2 tax.

Slovakia: Slovakia did not present a "with measures" scenario. The ranges of emissions given here reflect scenarios 2 and 3. Some of the measures indicated under the scenario have not been implemented (p. 50).

Sweden: Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995. The Swedish forecast assumes that the estimation of future additional emissions, resulting from an increased use of electricity, is based on an emission factor that "on average is equivalent to emissions for natural gas combined cycle plants" (p. 123).

Switzerland: The projection for the year 2000 given in the table results from a scenario with "implemented measures". Bunker fuel emissions were deducted from the total CO_2 emission level. A second scenario was developed with "measures under consideration". Under this scenario, a 10 per cent reduction of emissions would be reached as compared to the 3 per cent reduction under the "implemented measures" scenario. The CO_2 emissions exclude emissions arising from the generation of electricity which is subsequently exported.

United Kingdom: Land-use change and forestry were deducted from the summary CO_2 figure given in the second national communication. The figures given in the national communication represent the mid-point of the central scenarios in the United Kingdom Energy Paper 65 (p. 28).

* All references in parentheses are to the national communications.

Table C.2. CO_2 projections in land-use change and forestry until 2020[a] (Gigagrams)

	Base level (1990)		Last reported inventory[c]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[b] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[d]	-13 300		-13 580								
Belgium	-2 057	-2 057	-2 057	-2 057	0	-2 057	0	-2 057	0	-2 057	0
Canada[d]											
Czech Republic	-2 281	-2 000	-5 454	-5 000	-250	-5 000	-250	-5 000	-250		
Finland[e]	(-30 000)-	-24 500	(-14 000)-	(-17 000)-	(31)-(52)			(-15 000)-	(39)-(11)	(-27 000)-	(-10)-(-100)
	(-19 000)		(-7 000)	(-12 000)				(-22 000)		(+1 000)	
France[d]	-33 218		-46 801								
Germany[d]	-30 000		-30 000								
Iceland[d]											
Ireland	-5 160	-5 160	-6 230	-7 580	-47	-8 630	-67	-9 690	-88		
Netherlands	-1 500	-1 500	-1 700	-1 700	-13	-1 700	-13	-1 700	-13	-1 700	-13
New Zealand	-20 569	-20 569	-13 487	-18 944	-8	-20 807	-1	-21 208	-3	-31 654	-54
Norway	-10 200	-9 400	-13 637	-11 000	-17	-12 900	-37	-14 800	-58	-15 700	-67
Slovakia	-4 257	-4 257	-5 116	-5 227	-22			-7 957	-87	-12 397	-291
Sweden[f]	-34 368	-34 000	-30 000	-29 000	15	-26 000	24	-22 000	35		
Switzerland	-4 360	-4 360	-5 100	-5 100	-17	-5 100	-17	-5 100	-17	-5 100	-17
UK	18 776	20 600	9 945	11 100	-46	8 900	-57	8 700	-58		
USA	-459 000	-458 750	-428 000	-411 040	-10.4	-403 700	-12	-400 030	-12.8	-348 650	-24

[a] Negative values in Gg denote removal of CO_2. Positive values denote a net source of emissions. Negative values in percentage denote more removals in 2000 and beyond than in 1990, or a decrease in net emissions.

[b] Differences in 1990 levels between inventories and projections are, for example, due to revisions of inventories, rounding, or the fact that only a subset of the sources was projected.

[c] All Parties reported their last inventory for 1995, with the exception of Sweden whose last inventory was reported in 1992.

[d] Austria, Canada, Germany and Iceland did not present projections in land-use change and forestry. The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[e] Deviation relative to the projection base level calculated on the basis of the mean of the range (-30,000)-(-19,000) Gg.

[f] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

Only 13 Parties reported projections in the *land-use change and forestry* sector. For 12 Parties this sector was projected to show a net removal for the year 2000, while one Party projected it to remain a net source, although a smaller one.

For nine Parties, net CO_2 removals in 2000 were projected to increase, among them, the United Kingdom, for which forestry is affected by other emissions in the land-use change and forestry category. Two Parties projected the removal to remain stable even up to the year 2020 and one of them indicated that the removal could decrease up to the year 2000 and beyond.

In the long term (2020), five Parties projected an increase of their forestry removals. Finland presented a range with decreases for the year 2000 and with increases and decreases for the year 2020, both described as plausible options.

Notes*

Finland: The emissions for land-use change and forestry include emissions and uptakes from wetland drainage and peat extraction. The range of emissions given for Finland results from the two scenarios given in the national communication.

Netherlands: The projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

New Zealand: Three scenarios were reported on the basis of different planting strategies. The "central estimate of new planting post - 1997" is given in the table.

Norway: Three scenarios are presented: "maximum", "best estimate" and "minimum". The figures given in the table correspond to the "best estimate" scenario.

Slovakia: Projections were based on an analysis of the impact of measures to be applied (tree species composition change, afforestation of non-forest lands and protection of existing carbon stock in forests affected by emissions) listing three different scenarios. Figures presented correspond to the medium scenario.

United Kingdom: The emissions for land-use change and forestry include emissions and uptakes from wetland drainage and peat extraction.

* All references in parentheses are to the national communications.

Table C.3. Projected anthropogenic emissions of CH_4 until 2020 (Gigagrams)

	Base level (1990)		Last reported inventory[b]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[a] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria	587	587	580	600	2						
Belgium	634	626	635	530	-15	487	-22				
Canada	3 200	3 148	3 732	3 546	13	3 600	14	3 719	18	4 179	33
Czech Rep	888	886	733	742	-16	864	-3	951	7		
Finland	246	246	241	226	-8	206	-16	191	-22	179	-27
France[c]	3 017		2 844								
Germany	5 682	5 682	4 845	3 892	-32	3 004	-47	2 759	-51	2 505	-56
Iceland	14	14	14	13.5	-4	13.6	-3	13.9	-0	13.2	-6
Ireland	811	811	812	837	3	838	3	839	4		
Netherlands	1 104	1 067	1 063	788	-34	700	-34	611	-43	594	-44
New Zealand	1 706	1 706	1 635	1 541	-10	1 552	-9	1 573	-8	1 604	-6
Norway	432	432	469	414	-4	377	-13	332	-23	325	-25
Slovakia	409	401	316	251 - 401	(-37)-0	237 - 348	(-41)-(-13)	224 - 367	(-44)-(-9)		
Sweden[d]	324	302	296	284	-6	271	-10	262	-13		
Switzerland	244	244	235	229	-6	211	-13	192	-21		
UK	4 464	4 402	3 817	3 418	-22	3 227	-27	2 852	-35	2 670	-39
USA	29 710	29 676	30 975	26 186	-11	26 534	-11	26 534	-9	26 840	-10

[a] Differences between the inventory base level and the projections base level are, for example, due to revisions of inventories, rounding, etc.

[b] All Parties reported their last inventory for 1995, with the exception of Belgium and Germany whose last inventory was reported for 1994.

[c] The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[d] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

All reporting Parties except France provided CH_4 projections for the year 2000. All but three of these Parties accounted for 91 per cent of the aggregated inventory figures for 1990 and projected a stabilization or decrease in CH_4 emissions from their base years. This decrease is higher than 10 per cent for eight Parties. The growth in emissions for those Parties which projected an increase, is 13 per cent for one of them and lower than 3 per cent for the others.

With the exception of three Parties, the CH_4 emissions of the 1995 inventory of all reporting Parties are lower than or similar to those of the base projection level (1990), which in a certain sense confirmed the short-term projected trends.

Parties projected a similar trend in the projections beyond the year 2000. All but one of the nine Parties which presented CH_4 projections for the year 2020 expected a decrease.

Notes*

Austria: A "certain reduction" of CH_4 emissions beyond 2000 is expected (p. 146).

Slovakia: Slovakia produced two scenarios for CH_4: scenario 1, which can be taken as baseline, and scenario 3. As not all measures in scenario 3 are under way, the range of both scenarios is given here.

Netherlands: The projection is based on NEPP2 and SMEC policies with the "European Renaissance scenario" with high prices, "ER-High", as basic scenario. The value for 2005 has been interpolated. The Dutch projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

* All references in parentheses are to the national communications.

Table C.4. Projected anthropogenic emissions of N_2O until 2020 (Gigagrams)

	Base level (1990)		Last reported inventory[b]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[a] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[c]	11.6		12.8								
Belgium	30.8	27.9	32.3	30.4	9	32.5	15				
Canada	86.0	86.0	107.8	74.0	-14	77.1	-10	81.1	-6	88.3	3
Czech Rep	25.8	25	21.6	22	-12	24	-4	26	4		
Finland	18.0	18.0	18.0	21.5	19	23 - 25	28 - 38	24 - 25	33 - 39	23 - 26	28 - 44
France[d]	181.7		173.5								
Germany	226.0	226.0	219.0	162.0	-28	159.0	-30	157.0	-31	156.0	-31
Iceland	0.4	0.4	0.4	0.5	25	0.5	25	0.5	25	0.5	25
Ireland	29.4	29.4	26.0	26.0	-12	26.1	-11	26.1	-11		
Netherlands	51.2	62.6	58.5	65.2	4	67.0	7	68.1	9	70.1	12
New Zealand	47.5	47.5	46.7	46.0	-3	45.6	-4	45.7	-4	45.7	-4
Norway	15.0	15.3	14.0	16.0	5	16.5	8	16.9	11	17.7	16
Slovakia	12.5	10.9	7.8	6.8 - 10.6	(-37)-(-3)	6.9 - 11.7	(-36)-(7)	7.4 - 12.0	(-32)-(10)		
Sweden[e]	9.2	9.3	9.2	10.5	13	11.5	24	12.7	37		
Switzerland	11.5	11.5	11.8	11.7	2	11.6	1	11.3	-2		
UK	120.0	111.7	95.0	42.9	-62	48.3	-57	50.8	-55	53.3	-53
USA	426	426	467	367	-14	378	-11	402	-5.6	402	-5.6

[a] Differences between the inventory base level and the projections base level are, for example, due to revisions of inventories, rounding, etc.

[b] All Parties reported their last inventory for 1995, with the exception of Belgium and Germany whose last inventory was reported for 1994.

[c] Austria stated that reliable projections for 2000 and beyond cannot be presented because of revised emission factors, the existing emission projections for N_2O no longer agree with the emissions reported for 1990 and 1995 (p. 146).

[d] The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[e] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

All reporting Parties except Austria and France provided N_2O projections for the year 2000. Eight of these Parties accounted for 88 per cent of the aggregated inventory figures for 1990 and projected a stabilization or decrease in N_2O emissions from their base years. Some of the largest emitters of N_2O are among these eight Parties. The projected decrease is higher than 10 per cent for seven of these Parties, 62 per cent being the largest decrease. Seven Parties projected a growth of these emissions, ranging from 2 per cent to 25 per cent. A comparison of the last reported inventory with the base year is consistent with these projections for five of these Parties. Additionally, two Parties which projected decreases in their N_2O emissions for the year 2000 also reported a growth in their last inventory in relation to the year 1990.

Long-term projections have a similar trend to those for the year 2000. Five Parties projected an increase of their emissions, but four Parties projected a decrease for the year 2020. These five Parties account for 83 per cent of the 1990 inventory presented by the nine Parties.

Notes*

Netherlands: The projection of nitrous oxide emissions is based on existing policies under the assumption that these policies remain unchanged after 2000, with the "European Renaissance" scenario with high prices as basic scenario (p.77). Recent developments in manure practices in the agricultural sector could add an additional 3.5 Gg emissions per annum from 2000 onwards. The value for 2005 has been interpolated. The evaluation of emissions was undertaken on the basis of actual emissions (p. 78-79). The projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

Slovakia: In the second national communication two scenarios for N_2O were produced: scenario 1, which can be taken as baseline, and scenario 3. As not all measures in scenario 3 are under way, the range of both scenarios is given here.

* All references in parentheses are to the national communications.

Table C.5.1. Projected emissions of HFCs until 2020[a] (Gigagrams, CO_2 equivalent)[b]

	Base level (1990)		Last reported inventory	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[c] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[e]											
Belgium[e]			585								
Canada		500	500	2000	300	4000	700	7000	1 300	14 000	2 700
Czech Rep.[e]			1								
Finland		79	79	130	65	156	97	195	145	195	145
France[e]	2 970										
Germany	260	260	2 878	6 336	2 337	10 388	3 895	12 609	4 750	12 355	4 652
Iceland		14	14	26	90	40	286	66	471	166	1 185
Ireland[e]											
Netherlands	4 910	4 880	8 452	4 763	-2	5 767	18	8 964	84	16 119	230
New Zealand		183	183	213	16	247	35	287	57	583	219
Norway	244	244	200	800	300	1 300	550	1 600	700	1 900	850
Slovakia											
Sweden		200	195	800	300	900	350	900	350		
Switzerland[e]			260								
UK	1 366	1 366	2 545	2 390	75	(2 095 - 3 771)	(53 - 176)	(2 263 - 4 578)	(66 - 235)		
USA	44 040		76 652								

[a] Belgium, Finland, Germany, Iceland, New Zealand and the United Kingdom only reported aggregated data for HFCs. The secretariat therefore assumed that all these emissions were HFC-134a.

[b] Estimates based on IPCC 1995 GWPs, with an assumed horizon of 100 years.

[c] Canada, Finland, New Zealand and Sweden used 1995 as base level for the HFC projections. The secretariat used 1995 as base level to calculate the percentage deviation of Iceland.

[d] All Parties reported their last inventory for 1995, with the exception of Germany whose last inventory was reported for 1994.

[e] Austria, Belgium, the Czech Republic, Ireland, Slovakia and Switzerland did not present HFC projections. The preliminary version of the French second national communication submitted to the secretariat did not include projections. Most Parties that did not report on these gases argued that they had not been able to establish a comprehensive inventory of these gases and that they are on the way to doing so. Slovakia noted that it does not use or produce such substances.

Comments

Long-term projections of HFCs were provided by nine Parties. Slovakia noted that it does not use or produce these products. The United States presented projections of HFCs, PFCs and SF_6 aggregated and expressed in terms of their CO_2 equivalent. Of all the Parties which prepared projections of HFCs, the United States (for the three gases aggregated) expected a considerable growth in the emission of these gases as a consequence of the phase-out of CFCs, and the scheduled phase-out of HFCs under the Montreal Protocol. HFCs are used as substitutes for CFCs in refrigeration, automotive air conditioning and some other applications. The high increase observed in the table is also influenced by the fact that this transition has taken place mainly since 1992, when the HFC projection base levels were low. Some Parties, such as the Netherlands and the United Kingdom, projected a decrease of HFC emissions resulting from measures applied to reduce HFC-23 losses from the manufacture HCFC-22.

The projections presented are consistent with the reported emissions from 1990 to the year 1995. Their reported increase is larger in percentage terms than those projected for the three main greenhouse gases, but smaller in absolute terms.

In the long term, emissions of HFC gases are projected to increase and their relative importance will also increase. For example, the United States and the Netherlands projected that the overall emissions of HFCs, PFCs and SF_6 expressed in term of CO_2 equivalent will be higher than their N_2O emissions from the year 2000 in the case of the former, and higher than its CH_4 emissions from the year 2010 in the case of the latter. Among these three new greenhouse gases highest growth is expected for HFCs.

Notes*

With the exception of Canada, the Netherlands and the United Kingdom, which projected actual emissions, and Iceland, which projected potential emissions, Parties did not express clearly whether HFC emissions projected are potential or actual.

Netherlands: The projection of emissions is based on the "European Renaissance" scenario with high prices. The reference scenario of the projections is based on the assumption that the Montreal Protocol and its subsequent amendments is fully implemented (p. 78). The projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

Switzerland: Very rapid growth rates are anticipated in certain applications: 5-30 per cent in refrigeration and air conditioning, 3-5 per cent in insulation foam, 100 per cent in aerosol propellants (p. 87).

United States: This Party presented projections of HFCs, PFCs and SF_6 together (p. 116), expressed in terms of CO_2 equivalent. The secretariat was not able to separate those emissions. The figures presented are:

(Gigagrams of CO_2 equivalent)

Base level (1990)	1995	Projection deviation relative to the projection base level, base year = 100 per cent			
Projection (Gg)	Inventory (Gg)	2000 (Gg)	2005 (Gg)	2010 (Gg)	2020 (Gg)
87 984	135 790	153 720	252 940	333 606	486 780

The growth in baseline emissions of HFCs and PFCs is beginning now and can be expected to continue through 2000 and beyond (p.116).

* All references in parentheses are to the national communications.

Table C.5.2. Projected emissions of PFCs until 2020[a] (Gigagrams, CO_2 equivalent)[b]

	Base level (1990)		Last reported inventory[d]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[c] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[e]			7 7								
Belgium[e]	68		68								
Canada	5 936	7 144	6 019	7 420	4	7 420	4	7 420	4	7 420	4
Czech Rep.[e]											
Finland[f]		0 3	0 3	0 4	33	0 4	33	0 8	160	0 8	160
France[e]	2 002										
Germany	2 693	2 694	1 665	799	-70	784	-71	784	-71	784	-71
Iceland	305	305	54	88	-71	88	-71	88	-71	88	-71
Ireland[e]											
Netherlands	2 458	2 234	2 391	2 512	12	2 640	18	2 776	24	3 033	36
New Zealand	601	601	196	230	-62	237	-61	237	-61	251	-58
Norway	2 545	2 500	1 441	1 300	-48	1 200	-52	1 200	-52	1 200	-52
Slovakia[e]	499		321								
Sweden	400	400	390	500	25	500	25	600	50		
Switzerland[e]			66								
UK	2 085	2 085	569	575	-72	745	-64	894	-57		
USA	18 350		29 186								

[a] Belgium, Finland, Iceland, New Zealand and the United Kingdom reported only aggregated PFC figures. In order to estimate the CO_2 equivalent, the secretariat assumed that approximately 90 per cent was CF_4 and 10 per cent C_2F_6.

[b] Estimates based on IPCC 1995 GWPs with an assumed horizon of 100 years.

[c] Finland used 1995 as base level for the PFC projections.

[d] All Parties reported their last inventory for 1995, with the exception of Germany whose last inventory was reported for 1994. Finland projected PFC emissions but noted that they are small.

[e] Austria, Belgium, the Czech Republic, Slovakia and Switzerland did not present PFCs projections. The preliminary version of the French second national communication submitted to the secretariat did not include projections. Most Parties that did not report on these gases argued that they had not been able to establish a comprehensive inventory of these gases and that they are on the way to doing so. Slovakia noted that it does not use or produce such substances.

Comments

Long-term projections of PFCs were provided by nine Parties. Slovakia noted that it does not use or produce these products. The United States presented projections of HFCs, PFCs and SF_6 aggregated and expressed in terms of their CO_2 equivalent. Of the nine reporting Parties, five projected a decrease for the year 2000 as a result of reductions in emissions from the aluminium industry, where different measures are applied to reduce emissions in some countries. Four Parties projected an increase related to other uses of these products. The use of PFCs has been growing in use in the electronic and electric sectors, as well as in fire-fighting and solvent applications.

The projections presented are consistent with the reported emissions from 1990 to the year 1995.

The long-term projections have a similar trend to those for the year 2000.

Notes*

Switzerland: Consumption in the solvent sector is expected to increase at a rate of 10-50 per cent per annum. PFC emissions in the metal industry (aluminium) will decline, as plans exist to stop production in Switzerland (p. 87).

Netherlands: Dutch projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

United States: This Party presented projections of HFCs, PFCs and SF_6 together (p. 116), expressed in terms of CO_2 equivalent. The secretariat was not able to separate those emissions. The figures presented are:

(Gigagrams of CO_2 equivalent)

Base level (1990)	1995	Projection deviation relative to the projection base level, base year = 100 per cent			
Projection (Gg)	Inventory (Gg)	2000 (Gg)	2005 (Gg)	2010 (Gg)	2020 (Gg)
87 984	135 790	153 720	252 940	333 606	486 780

The growth in baseline emissions of HFCs and PFCs is beginning now and can be expected to continue through 2000 and beyond (p.116).

* All references in the parentheses are to the national communications.

Table C.5.3. Projected emissions of SF_6 until 2020 (Gigagrams CO_2 equivalent)[a]

	Base level (1990)		Last reported inventory[c]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projections[b] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[d]			7 7								
Belgium[d]	478		478								
Czech Rep [d]											
Canada	2 868	2 868	1 888	1 912	-33	1 912	-33	1 912	-33	1 912	-33
Finland		96	96	120	25	143	49	143	49	143	49
France[e]											
Germany	3 896	3 896	5 999	4 971	28	4 445	14	5 401	39	6 979	79
Iceland[d]											
Ireland[d]											
Netherlands	1 386	1 386	1 458	1 625	17	1 793	29	1 960	41	2 271	64
New Zealand	550	550	4 374	5 067	821	5 879	969	6 812	1 139	9 154	1 564
Norway	2 200	2 200	574	525	-76	525	-76	600	-72	700	-68
Slovakia[d]											
Sweden	956	1 000	1 243	1 200	20	1 200	20	1 200	20		
Switzerland[d]			717								
UK	574	574	621	1 028	79	1 028	79	1 052	83		
USA											

[a] Estimates based on IPCC 1995 GWPs with an assumed horizon of 100 years.

[b] Finland used 1995 as base level for the SF_6 projections.

[c] All Parties reported their last inventory for 1995, with the exception of Germany whose last inventory was reported for 1994

[d] Austria, Belgium, the Czech Republic, Iceland, Ireland, Slovakia and Switzerland did not present SF_6 projections. The preliminary version of the French second national communication submitted to the secretariat did not include projections. Most Parties that did not report on these gases argued that they had not been able to establish a comprehensive inventory of these gases and that they are on the way to doing so. Slovakia noted it does not use or produce such substances

Comments

Long-term projections of SF_6 were provided by eight Parties. Iceland and Slovakia noted that they do not use or produce these products. The United States presented projections of HFCs, PFCs and SF_6 aggregated and expressed in terms of their CO_2 equivalent. Of the eight reporting Parties, two projected a decrease for the year 2000 as a result of improved practices in magnesium production. Six Parties projected an increase related to other uses of these products. The use of SF_6 has been growing in the electronic and electric sectors, as well as for insulation (soundproof windows) and as a pressure-stabilizing gas for tyres.

The projections presented are consistent with the reported emissions from 1990 to the year 1995.

The long-term projections have a similar trend to those for the year 2000.

Notes*

Switzerland: The information available is insufficient to define a trend (p. 87)

Netherlands: The projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

United States: This Party presented projections of HFCs, PFCs and SF_6 together (p.116), expressed in terms of CO_2 equivalent. The secretariat was not able to separate those emissions. The figures presented are:

(Gigagrams of CO_2 equivalent)

Base level (1990)	1995	Projection deviation relative to the projection base level, base year = 100 per cent			
Projection (Gg)	Inventory (Gg)	2000 (Gg)	2005 (Gg)	2010 (Gg)	2020 (Gg)
87 984	135 790	153 720	252 940	333 606	486 780

The growth in baseline emissions of HFCs and PFCs is beginning now and can be expected to continue through 2000 and beyond (p.116).

* All references in parentheses are to the national communications.

Table C.6. Projected anthropogenic emissions of all greenhouse gases, excluding land use change and forestry until 2020[a] (Gigagrams, CO_2 equivalent)[b]

	Base level (1990)		Last reported inventory[d]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[c] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austria[e]	77 814		78 173								
Belgium	138 943	137 595	145 522	145 754	6	153 602	12				
Canada	566 664	566 480	619 726	609 118	8	635 513	12	669 252	8	766 544	35
Czech Rep	192 130	193 356	150 913	161 402	-17	178 594	-8	194 031	-0		
Finland	64 546	65 546	66 691	69 660	9			(67 790-67 900)	5	(60 227 - 60 607)	(-7)-(-6)
France[f]	503 181		498 855								
Germany	1 210 387	1 210 232	1 070 691	1 038 058	-14	994 991	-18	979 403	-19	968 083	-20
Iceland	2 883	2 565	2 765	3 250	27	3 365	31	3 494	36	3 630	42
Ireland	56 861	56 864	59 060	60 625	7	64 486	13	66 454	17		
Netherlands	215 357	223 313	236 154	219 160	-2	226 670	2	235 642	6	257 658	15
New Zealand	77 188	77 178	80 913	83 211	8	86 661	12	90 784	18	101 399	31
Norway	54 011	54 515	54 328	60 279	11	63 057	16	63 611	17	62 112	14
Slovakia	72 995	73 064	57 891	55 840	-24	61 875	-15	66 975	-8		
Sweden[g]	66 457	68 225	69 004	71 447	5	73 919	8	74 996	10		
Switzerland	53 749	55 789	53 806	52 336	-6	52 727	-6	53 235	-5		
UK	718 764	711 094	656 872	639 072	-10	679 608	-4	674 849	-5	754 593	6
USA	5 803 278	5 803 278	6 146 624	6 444 828	11	6 789 432	17	7 134 036	23	7 324 668	26

[a] Figures from tables C.1, C.3, C.4, C.5.1, C.5.2, and C.5.3 have been used as the starting point for these projections. Only gases and sources that were projected are included.

[b] Using IPCC 1995 GWPs, with a time-horizon of 100 years.

[c] Differences in 1990 levels between inventories and projections are, for example, due to revisions of inventories, rounding, and temperature adjustments for the projection base level (Netherlands, Sweden and Switzerland).

[d] All Parties reported their last inventory for 1995, with the exception of Belgium whose last inventory was reported for 1994.

[e] Austria did not present projections for N_2O and its projection for CH_4 is only for the year 2000 (p. 146). The secretariat did not present all its greenhouse gases projection to ensure consistency of reporting amongst Parties.

[f] The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[g] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

When all projected emissions (excluding *land-use change and forestry*) are totalled using IPCC 1995 GWPs for all reported projections (except Austria), nine of them (BEL, CAN, FIN, ICE, IRE, NOR, NZL, SWE and USA) accounted for 73 per cent of the aggregated 1990 inventory and was an increase projected for the year 2000. The largest increases corresponded to Iceland (22 per cent) the lowest emitter and to the United States (14 per cent) the highest emitter among reporting Parties. Six Parties projected a decrease. Among them, the two EIT countries which projected substantial decreases were the Czech Republic with -17 per cent and Slovakia with -24 per cent.

Projections to the year 2020 revealed a different pattern: only two Parties, Finland and Germany, projected a decrease, Germany being the Party with the larger decrease (-20 per cent). The other eight Parties projected an increase and among them there were five Parties (CAN, ICE, NZL, SWE and USA) with increases higher than 25 per cent.

Notes*

Austria: Austria did not present projections for N_2O and its projection for CH_4 is only for the year 2000.

France: The preliminary version of the French second national communication submitted to the secretariat did not include projections.

Netherlands: The projections figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

Slovakia: The Slovakian aggregated projections presented here are taken from the "medium scenario". They include CO_2, CH_4 and N_2O emissions only.

* All references in parentheses are to the national communications.

Table C.7. Projected anthropogenic net emissions of all greenhouse gases, including land use change and forestry until 2020[a] (Gigagrams, CO_2 equivalent)[b]

	Base level (1990)		Last reported inventory[d]	Projection and percentage deviation relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection[c] (Gg)	(Gg)	2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Austriae	64 514		64 593								
Belgium	136 886	135 538	143 465	143 697	6	151 545	12				
Canada[e]											
Czech Rep	189 849	191 356	145 459	156 402	-18	173 548	-9	189 031	1		
Finland	(34 546 - 45 546)	41 046	(53 137 - 59 691)	(52 660 - 57 660)	(29 - 41)			(52 790 - 45 900)	(14 - 30)	(33 227 - 62 147)	(-17) - (53)
France[e]											
Germany[e]											
Iceland[e]											
Ireland	51 701	51 701	52 830	53 045	3	55 856	8	56 764	10		
Netherlands	213 857	221 813	234 454	217 460	-2	224 970	1	233 942	6	255 928	15
New Zealand	56 619	56 619	67 426	64 267	14	65 854	16	69 576	23	69 745	23
Norway	43 811	45 115	41 241	49 279	9	50 157	11	48 811	8	46 412	3
Slovakia	68 738	68 738	52 775	50 613	-26			59 018	-14		
Sweden[f]	32 089	34 225	37 048	42 447	24	47 919	40	52 996	55		
Switzerland	49 389	51 429	48 706	47 236	-8	47 627	-7	48 135	-6		
UK	737 540	731 694	666 817	650 172	-11	688 508	-6	683 549	-7		
USA	5 345 028	5 345 028	5 718 624	6 034 236	13	6 386 172	19	6 734 442	26	7 324 668	37

[a] Figures from tables C.6 and C.2 have been used as the starting point for these projections.

[b] Estimates based on IPCC 1995 GWPs, with an assumed horizon of 100 years.

[c] Differences in 1990 levels between inventories and projections are, for example, due to revisions of inventories, rounding, and temperature adjustments for the projection base level (Netherlands, Sweden and Switzerland).

[d] All Parties reported their last inventory for 1995, with the exception of Belgium and Sweden whose last inventories were reported for 1994 and 1992 respectively.

[e] Austria, Canada, Germany and Iceland did not present projections in the land-use change and forestry subcategory and therefore they were not included here. The preliminary version of the French second national communication submitted to the secretariat did not include projections.

[f] Sweden reported 1995 rather than 1990 as the base level for projections. All variations from the base level are thus given in relation to 1995.

Comments

When the available data for *land-use change and forestry* (from 12 countries) were aggregated with other projected emissions, the differences between net and gross figures were not great for most Parties in relation to the projections for the year 2000. For eight of them the differences in the percentage deviation relative to the projection level (comparison of tables C.6 and C.7) were not higher than 4 per cent. Some Parties which presented higher differences (FIN, NZL and SWE) reported larger increases in the net emissions than in the greenhouse emissions excluding land-use change owing to a loss in the sink capacity of their forest during the decade 1990-2000. In their projections beyond 2000 this trend is reversed for Finland and New Zealand, indicating the temporary character of the direction of the carbon fluxes in the land-use change and forestry category, in these countries.

The pattern of the projections is similar to that of all the greenhouse gas emissions excluding *land-use change and forestry* presented in table C.6. Seven Parties projected an increase and five Parties a decrease of these emissions. The difference in numbers with those presented in table C.6 is related to the fact that Canada and Iceland, which projected an increase, and Germany, which projected a decrease, were not included in this table because they did not present projections of *land-use change and forestry* emissions.

Notes*

It should be noted that as the aggregation of sources and sinks commonly leads to lower aggregate emissions, the uncertainty of these figures is increased. The consequence of the higher uncertainty attached with land-use and forestry emissions.

Netherlands: The projection figures are to be updated by the end of 1998, and should therefore be interpreted with caution.

* All references in parentheses are to the national communications.

C.8. Projected CO_2 emissions of bunker fuels (Gigagrams)

	Base level (1990)		1995 inventory (Gg)	Projection relative to the projection base level, base year = 100 per cent							
	Inventory (Gg)	Projection (Gg)		2000		2005		2010		2020	
				(Gg)	(%)	(Gg)	(%)	(Gg)	(%)	(Gg)	(%)
Iceland	319	319	377	377	19	427	34	474	49	553	74
Ireland	1 172	1 172	1 510	1 465	25	1 414	21	1 253	7		
New Zealand	2 413	2 413	2 736	2 645	10	3 378	40	3 251	35	3 967	64
Sweden	4 207	5 400	5 367	5 900	9	6 300	17	6 800	26		
Switzerland	2 160	2 100	2 430	2 700	29	3 000	43	3 200	52		

Comments

Only five Parties, accounting for 8 per cent of the 1990 inventory of the reporting Parties, projected CO_2 bunker emissions. All of them projected an increase of these emissions for the year 2000. The percentage growth of bunker emissions is higher than for their CO_2 emissions (excluding *land-use change and forestry*) presented in table C.1.

The projections presented are consistent with the reported emissions from 1990 to the year 1995.

Notes

Only five Parties projected emissions of bunker fuels.

New Zealand: Information on the share of air and marine bunker emissions in projections is also given in the national communication (p. 95).

Sweden and New Zealand also projected emissions for other greenhouse gases and precursors. The secretariat did not present them for the sake of consistency in the reporting. The relationship of these gases to CO_2 in terms of CO_2 equivalent is in any case very small (1: 160 in the case of Sweden and 1: 600 in the case of New Zealand).